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AMERICA VS. EUROPE IN INDUSTRY

A Comparison of Industrial Policies and Methods of Management

By

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To Captain John Case Phelps
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PREFACE

In view of the astonishing strides which industry has made during and since the war, in England, France, Italy, and Germany, as well as in America, it has seemed desirable that the information presented in these pages should be disseminated as rapidly as possible, in the interest of standardization of industry and elimination of industrial wastes.

The subject is so extensive that although more than a year has been devoted entirely to gathering and arranging the material, I am keenly aware of the inadequacy of the presentation from certain standpoints. Unquestionably, also, the volume contains errors of fact, which through inadvertence have escaped detection. It was necessary, however, to choose between the course of presenting a mass of verified detail long after it had become ancient history and that of presenting the broad, general facts at once—while the wonder the Great War wrought in industrial methods and conditions was still upon us.

It should be said that special effort has been made to avoid controversial matter, to keep away from enthusiastic exposition of theoretical panaceas, and to concentrate upon such matters as would interest the capable and practical business men in search of tried and successful methods of administration. In the light of nearly twenty years' experience as laborer, foreman, superintendent, manager, and consulting engineer, the effort has been made to set down and interpret the experience of the most successful and far-sighted industrial executives here and abroad. The hope is that the record may aid those who now control the policies of our great industries, and those who are to control them in the future, to discharge their

increasingly great responsibilities with the highest possible degree of effectiveness.

It is obviously impossible to make adequate acknowledgment to all who have lent their assistance in the investigations here summarized. Nevertheless so great was the courtesy and hospitality of certain of the industrial leaders abroad who gave me generously of their time that I wish to thank especially:

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Allgemeinen Elektricitäts Gesellschaft, the Borsig locomotive plant, the Ludwig Loewe plant, etc., etc.

I wish to acknowledge also the exceedingly intelligent assistance I received from the commercial attachés at the various United States embassies, whose knowledge of the conditions of the countries in which they are stationed is intimate and accurate. The more fully American business men avail themselves of the expert service available in this connection, the wider and more profitable will our foreign business prove. And finally, let me thank the newspapermen of Europe—men of the type of the Associated Press representatives and of the representatives of such papers as the *London Times* and *Paris Herald*—for their help, which proved invaluable. These men with their unbiased viewpoint, their high ideals and their ability to present facts interestingly are the promoters of understanding between the nations of the earth at a time when mutual regard, mutual trust, and mutual understanding are essential to the survival of industrial civilization.

DWIGHT T. FARNHAM

New York City,
December 1, 1921.

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America vs. Europe in Industry

CHAPTER I

FUNDAMENTAL CONDITIONS

The War and Industrial Efficiency

During the war the efficiency of American industry increased materially. This was due essentially to patriotism—which substituted the open mind for hidebound conservation, and which made results more important than the retention of traditional methods. Furthermore there was a general pooling of experience which raised the average level of proficiency considerably. Manufacturers visited each other's plants. They discussed methods of administration, types of buildings, and mechanical equipment with a frankness that had previously been considered impossible. Men of unusual ability who had up to that time devoted their energies to their own business became available as advisers to industry in general. Men who had previously felt self-sufficient demanded expert help. The government organized control boards, advisory boards, educational boards—whose orders were law. Raw materials were dealt with as to quantity, quality, and distribution. Labor was not only allocated—but analyzed, diluted, and trained. Business men sitting on such boards gained an insight into underlying principles of industry which could have been gained in no other way.

Methods that were good enough when private gain was the consideration were scrapped and replaced by the best that the organized intelligence of the country could devise. New plants were erected embodying all that had been learned at home and abroad.

The best minds of Europe came to America and placed their experience at the disposal of our manufacturers, finan-

ciers, and directors of transportation. And behind it all was the urge of necessity—the need to win in the race for production, and for the conservation of man-power, if the nation was to survive.

America had eighteen months of intensive education in industrial efficiency. Europe had nearly five years. She was 3,000 miles closer to hell, and above the whir of the machinery there was always the roar of guns. Conservatism and traditional inefficiencies break down very rapidly under such circumstances.

Europe After the War—A First-Hand View

Realizing the situation and feeling the value of still further consolidation of this knowledge gained during the war, the writer sailed for Cherbourg early in the summer of 1920 with the intention of studying, on the ground, the industrial situation in France, Italy, Germany, and England from the standpoint particularly of the increase in administrative knowledge and in principles and methods of executive control, in the most ably operated industries. To this end and because of the fact that a good deal of ground had to be covered in six months, the advice of government officials, civil and military, bankers, educators, and manufacturers who had been overseas since the armistice, was supplemented by similar information secured from the same type of men upon arrival in each country visited. The most efficiently managed plants were always sought, rather than the largest and most famous, on the ground that it is the ability of the leaders which ultimately locates the average level of a country's industries, the purpose of the study being to secure information which would increase the effectiveness with which industry is operated rather than to compare the average levels of operating efficiency in different countries.

The writer was fortunate in his contacts, spending some time in Italy as a member of an American commercial mission

which, as the guest of the Italian government, visited not only the country's principal industries but came in contact with its industrial leaders under unusually favorable circumstances. He was admitted to various German plants at the request of the Foreign Office and the Deutsche Bank. In France he was a guest at Monsieur Schneider's chateau at the Le Creusot plant, to which visitors are admitted only with the permission of the War Department, and in England he was not only accorded unusual opportunities to study industrial establishments but was fortunate enough to be in close touch with various labor leaders at the beginning of the coal strike.

Typical of the plants visited in Italy may be mentioned those of the Fiat Motor Company in Turin, the Ansaldo shipbuilding and steel plants in Genoa, and the Breda locomotive plant in Milan. In Germany such concerns as the Allgemeinen Elektricitäts Gesellschaft, the Ludwig Loewe Machine Tool Company, and the Borsig Locomotive Factory were studied. In France the steel and locomotive plants of the Schneider Company, and the Berliet, Renault (see Figure 1), and Citroen motor plants are typical of those investigated. Among those visited in England may be mentioned several of the Vickers plants, the Renold plant, Cadbury's, and Port Sunlight.

Actual Conditions

In visiting industrial plants arrangements were made to secure contact with the directors so that problems of administration could be discussed as well as those of manufacture. In addition government specialists, educators, publicists, labor leaders, welfare workers, consulting engineers, workmen, foremen, and managers were consulted as well as the usual sources of information open to the tourist of a curious turn of mind.

Particular attention was given to problems of administration and organization to the executive control of production—

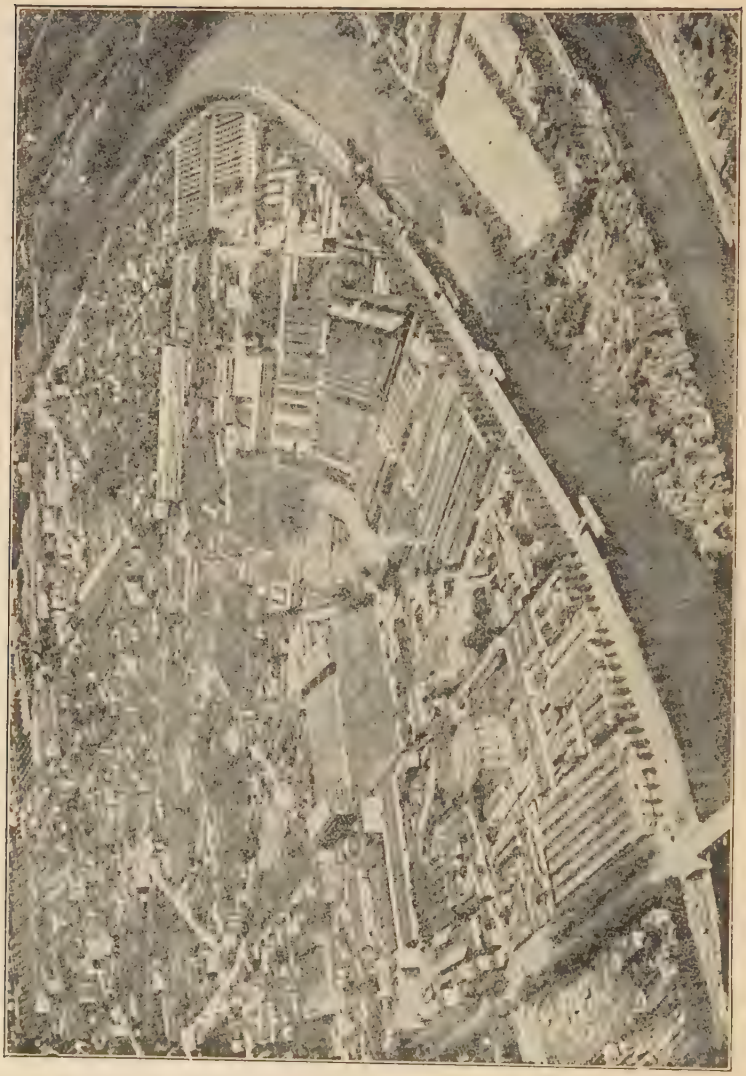

Figure 1. Renault Automobile Plant in Paris

both of labor and material—and to industrial relations. Buildings were studied from the standpoint of their adaptability to the work to be carried on in them, rather than from that of their construction. Special attention was given to mechanical handling systems but machine types were regarded chiefly as an indication of manufacturing efficiency and the principle involved was noted, rather than any attempt being made to bring away detailed information as to dimensions or anything which might be regarded as a structural trade secret. Education was studied principally from the standpoint of its effect upon the future of industry as were such semieconomic subjects as shop government plans, the co-operative movement, profit-sharing, and housing. After all we have become an industrial world, and whatever influences the future of industry, shapes the citizen, and determines the importance and the survival of the nation—perhaps even the survival of our modern civilization.

Under the circumstances there should be no iniquity in assuming the attitude of the cold-blooded business man and of the research engineer in quest of what will benefit American industry directly, especially since business has become international and the fallacy of splendid isolation for any country clearly recognized. Most of our information about Europe has been furnished—for one purpose or another—by the uplifter, the impractical socialist, the calamity-howler, and the clever writer in search of something which will jar the jaded palate of a public almost insensible from the thrills of the last six years. I shall therefore make no apology for the omission of "sob stuff" or for a frank endeavor to present without frills such facts as will increase the efficiency of industry if applied by men of industrial experience and with a first-hand knowledge of human nature.

The assumption that European industry had made progress during the war was found to be eminently justified. In every

country visited huge ferro concrete buildings of the latest type have sprung up since 1914. These are mostly filled with American types of machine tools—paid for during the war. Wide-spread consolidations of capital have taken place so that in England, France, Italy, and Germany there are individual organizations including over 100,000 men. In Germany the government is so organizing all industries that the benefits of mass purchasing, research, and standardization may be enjoyed by even the smallest concerns. Italy and France are turning their Alpine waterfalls into power to an extent that presages the replacement with this "white coal" of black coal imported at ruinous prices. Belgium is building her power plants at the mines, finding it cheaper to ship current over wires than coal, ashes, water, and sometimes ice in freight cars. Even England is planning hydro-electric monsters.

Scientific management, in whole or in part, has been introduced into factories in Germany, Italy, France, and England. Time studies—the determination of a fair day's work by exact methods—have been in use in France since the seventeenth century. The larger Italian concerns have their industrial engineers whose work is to install the latest and most effective methods of manufacture. The most complete installations of scientific management I have ever seen are in England. At Le Creusot methods of rate-setting, which we "invented" in America only a few years ago, have been in use for over thirty years. Employment management, which we discovered and heralded to the world during the war, has been a part of French and Italian industrial organization since about the time of the American Revolution. We have no such safety and hygiene museums as exist in Germany. Our workmen and foremen are untrained as compared with those of Germany and France. The art of fitting the man to the job is still in its infancy in America.

We are still plunging about in a sea of experiment as

regards workmen's representation plans, welfare work, and industrial housing as compared with England. Co-operative stores are still a doubtful experiment with us. Neither are European methods of industrial management the hoary collection of soothsayers' aphorisms they are popularly supposed to be by Americans who before the war took the sort of Cook's tour through a European factory which Henry Ford offers farmers visiting Detroit.

Regardless of the level of industrial efficiency at which Europe started in that grim race, which began in August, 1914, for production of quantity and quality with the least expenditure of man-power, with the least expenditure of material, and with the least expenditure of coal and supplies, she has now a record of industrial achievement of which she may well be proud. The time has passed when the American manufacturer can vent the spleen gathered in the art galleries and the cathedrals, through which his wife has dragged him, upon the antiquated factory buildings of Western Europe. Industrially Europe has arrived, and if the present trend continues, our European competitors may, before many years, visit America to envy us our Metropolitan Museum of Art and to sneer at our industrial establishments.

Industrial Disorganization

Before turning to the discussion of specific factors in industry, brief consideration of certain fundamental conditions will render what is to follow more clear. In the first place the five years during which the population of Europe had been withdrawn from production and actively engaged in distruction, had left the world short of everything. The economic balance, which had been slowly built up since the beginning of the Steam Age in the eighteenth century, was roughly destroyed by the economic isolation of Russia, by the Balkanization of Central Europe, and by the impoverishment of

Germany. Before the war Russia provided the grain and the raw materials which England and Germany needed and furnished a market for low-grade materials—cotton, wool, etc.—and for manufactured goods which could not be absorbed elsewhere. The formation of a number of new countries in Central Europe meant government by the inexperienced and the satisfaction of long-supposed racial hatreds, until such time as self-control and knowledge of life could be acquired.

As yet the new countries have the faults of the young: vanity, lack of knowledge of cause and effect, a proneness to get themselves into trouble or to be led into trouble by those with an axe to grind—faults which only time can cure. Meantime those who must come in contact with them also suffer. The postponement of the fixture of the German indemnity kept Germany in the mental state of a business man who does not know whether the tax collector will take merely all he can find, or whether he will in addition send him to the penitentiary and garnishee his wife's wages. Under such circumstances he is more inclined to move slowly and to conceal his assets than to branch out into new business and to display initiative. Meantime there is naturally considerable distrust of Germany's general integrity. She is thus a long way from functioning normally either as manufacturer or as consumer. In fact the whole economic world as regards raw materials, manufactured goods, and commerce—with Russia out of it and with Central Europe thoroughly disturbed—may be likened to a man who has suffered temporary paralysis of a major organ and who has several other organs in bad condition. No part of that man is going to feel right until every organ is functioning normally. It doesn't matter how much he hates his stomach, his job is to get it into condition again. The evolution of the economic world to the state in which it existed prior to 1914, was too gradual and the resultant economic organism too closely knit, to permit general and unlim-

ited surgery—no matter how necessary—without unpleasant results.

National Difficulties

In addition to difficulties due to Europe's failure to function smoothly as an entity, the various integral parts also suffer from their own peculiar ailments. Italy has about 3,000,000 more men than the country can support. These men—known in Italy as "the swallows"—formerly built railroads in Russia, harvested grain in Hungary and South America, and emigrated to the United States. Russia is shut. Money earned in Central Europe isn't worth bringing home and steamship rates to America at the present rate of exchange are impossible. As a result these men are engaged in building roads, harbors, canals, and various other public works at the expense of the Italian government in order to prevent starvation and disorder. Her factories are many of them idle for lack of raw material and coal. As things stand she must continue to support her excess population, ship about 300,000 men abroad a year, or secure raw materials sufficient to keep the great industries, built up during the war, in full operation.

During the war France lost 57 per cent of her men between the ages of 19 and 32 who were mobilized—and 89 per cent of her men were mobilized. She is short of labor, but she won't take Italians because of certain ancient difficulties with them. She is dependent upon the payment of the German indemnity to meet her budget so she is incurring great expense to maintain an army to enforce this payment if necessary. France is in much better balance than the other European countries, producing more of her foodstuffs and manufacturing a large proportion of what she needs. She is thrifty, her courage is magnificent, and the speed with which the devastated districts have been reconstructed is marvelous.

Germany is handicapped by a bad reputation, by a currency so depreciated that it is difficult to buy raw materials, and by the bewilderment of freedom after years of existence in which every act was directed to the last detail by indisputable authority.

England is handicapped by lack of markets in Russia and in Central Europe and by labor troubles. Two-thirds of Great Britain's foodstuffs must be imported. She can pay for these only by the sale of manufactured goods—which means competition with other countries. Labor has decreased production to such an extent that in many cases rising costs made production impossible. Until the issue is fought out and a better understanding is obtained between capital and labor, a return to normal conditions in England is unlikely.

Exaggerated Nationalism

Since the war an exaggerated nationalism has developed throughout the world. All the racial jealousies which were repressed in the face of the common danger during the war have come to the surface now that the crisis is past. The race for commercial advantage under altered economic and political conditions has replaced the co-operation of allies engaged in a common task. Italy feels that France was allotted more than her share of the indemnity and that England is exerting an unfavorable influence in the Danube country and in the Balkans. France has lost heavily. The income of almost every French family has been to some extent affected as the result either of the devastation of war or of Russia's repudiation of her obligations. France can see relief only through Germany's being made to pay to the utmost. She feels that England as a manufacturing nation is following her own interest and doing everything possible to open the German and Russian markets. Germany is anxious to re-establish herself with England and America for commercial

reasons. She hates France with the tribal hatred of the dog for the cat and as the visible strong arm enforcing to the ultimate letter the treaty of Versailles. England is following her usual plan of saying little, watching closely, and energetically pursuing the policy of "business as usual." America is regarded by all with the mixed feelings of envy, hope, and expectation with which an impoverished family regards a rich relative.

A part of this is, I believe, reaction from the unnaturally close association during the war. With the development of international finance, international commerce, world transportation and industry requiring world markets—under the influence of steam and electricity, which, in point of time, has brought France closer to America than New York was to Philadelphia in Benjamin Franklin's time—sincere co-operation is essential. Ancient grudges are too expensive to maintain and the faster the world learns this the quicker will be the recovery from the recent convulsion.

Slow Return to Thrift and Production

Convalescence has been marked by much the same symptoms in every country. Five years' lack of production and destruction can be repaired only by thrift and increased production. The return to thrift has been marked by the buyers' strike—the refusal of the public to buy at prices which scarcity made it possible to demand, and the consequent reduction of the public's standard of living. This began in America early in 1920 with the "overall movement."

The return to production, the reawakening of the willingness to work, and the battle with the tendency loosely termed "Bolshevism" began first in America with the suppression of radicals in 1919. France followed when the cavalry dispersed the red flag processions and smashed the one big union idea in May, 1920. The Italian Reds seized the factories in August,

1920, but after discovering that they could secure no raw materials, that no one would buy their finished product, and that there was a certain thing called "management," they climbed down as gracefully as possible upon the government's agreeing to endeavor to work out some plan by which labor could participate in management. Germany had one fight with radicalism in the spring of 1920 and another late in the autumn when an attempt on the part of certain radical employees to seize the factories in Berlin resulted in the workmen's being thrown out on their heads by the police. England's battle is not yet finished but is proceeding through the usual series of compromises. Meantime the obvious decay and putrefaction of Russia under radicalism with strong backs and weak heads in the saddle was giving pause to those who had forgotten the limitations of human nature in their enthusiasm for the immediate Utopia.

As the armies were demobilized the soldiers throughout the world rightly felt that they were entitled to a period of rest and recreation. Army life, which under conditions of modern warfare consists of long periods of inactivity followed by periods of intense excitement, with initiative and the fear of going hungry reduced to the minimum, is not conducive to an immediate return to the conditions of industrial life. There was a period, therefore, during which various substitutes for work were tried out and found wanting.

Various nations attempted to enrich themselves by the free use of the printing press and it remained for them to learn by bitter experience that the value of paper money is in inverse ratio to the quantity issued. This was a period of panacea-hunting. The world was still weak from the ravages of that plague which for five years threatened the life of western civilization. It desired above all—even as does the typhoid convalescent—to drink a deep draft of something which would make it well and strong all at once. But it was observable

that the nations that first quit panacea-hunting and went back to work recovered their normal strength the fastest. It seems so simple that the only way to have things is to produce them, that it doesn't seem credible that it took the world two years to realize that fact and to return to work.

Psychology of the Business Cycle

Extortionists—men who had cornered the supply of certain materials and manufactured goods, profiteers who demanded more for their goods or for their labor than they were worth, just because goods and labor were scarce—had to learn the lesson that the execution of the producer of auriferous goose eggs is bad policy.

Theodore Roosevelt once defined work as "onerous exertion between periods of inspired enthusiasm." Most of us are short on inspired enthusiasm. We don't like to work. Furthermore when fate plays into our hands—creates two jobs for one man, pays us big wages for short hours, and makes the boss properly appreciative of our sterling value—we *don't* work. We become independent and we buy silk shirts—and really you can't blame us. Human nature is responsible. When we get to the point where we don't do *any* work and demand limousines, the price of limousines gets so high—since the makers of pleasure cars aren't doing any work either—that we revolt. We quit buying limousines and silk shirts and shoes—and then the factories are shut down and we are out of a job.

After a period of involuntary repentance we become wildly anxious to work. We don't want limousines—we want bread. We become thrifty and production is considered practically in the factory rather than academically in the lecture hall. Gradually industry starts up. We are willing to do a fair day's work for a fair day's pay. Production costs are reasonable. The speculators who withheld goods from circu-

lation on a rising market have also been smoked out and we can buy shoes cheaper at the bankrupt sales. Some of us even put aside a little money for the next rainy day. We have learned our lesson of thrift and hard work again at first hand in the bitter school of adversity and will probably remember the lesson until just about the day the crop of easy times produced by this same thrift and hard work goes to our heads again and we again insist on limousines, no work, and big pay.

A lot of people have for years been preaching thrift and hard work. But somehow we don't learn our lessons through our ears. An empty stomach speaks so much more convincingly to most of us that we have to wait for a warning from that quarter of our anatomy before we take notice. It is unfortunate, but it is human nature, and human nature is very much the same the world over.

Vitality of European Nations

But in the study of symptoms and underlying causes we must not forget that Europe has been populated for over a thousand years with a sturdy and vital people—that boundaries have shifted and kings have fallen, but that life and the nations have endured. This wasn't the first war in the history of Europe. Her people have survived even worse devastation in the past and have not only overpopulated Europe but have populated America, Australia, and Africa as well. Even after casualties of over 10,000,000, you can get a house easier in New York than you can in London, Paris, or Berlin.

Neither must we forget that the reports which reach each nation about the others represent the unusual, the abnormal. Humanity wants news—something sensational—the fact that a grocery store in Milan has been sacked—not the fact that all is as quiet in 10,000 other European cities as it is at

Salem, Massachusetts. Furthermore a lot of things look worse on paper than they really are. Take the financial statements of certain Western European countries. They are not cheerful reading. But we must remember that even bankrupts have continued to eat three square meals a day and to keep on having children. Some of them have even settled with their creditors eventually for a hundred cents on the dollar. Western Europe is no more bankrupt than the United States would be next Monday if the whole 100,000,000 of us collected all that our debtors, including the banks, owed us. The basic fact is that Western Europe has gone back to work and is producing.

International Markets

It has been estimated that the prosperity of this country depends upon the profitable exportation of the 2 per cent produced beyond our actual needs. Regardless of whether this figure represents the exact average or not, there is no doubt that there is a surplus of various articles. When the surplus cannot be sold, a seller's market becomes a buyer's market. Thereupon somebody who holds this 2 per cent and needs money cuts the price. Then the public concludes—"the profiteers are on the run, let's stop buying, prices are on the toboggan." We all stop buying, the factories shut down, and then, lo and behold, dividends on industrial stocks are passed, customers don't pay their bills, and labor walks the streets hungry. We have hard times and the bottom falls out of the stock market—since the price of stocks depends upon the physical assets behind them—the factory, the railroad, and the ships.

The earning power of industry, which controls the incomes of most of us, depends upon its ability to dispose of its product —whether pickles or passenger service—at a slightly greater price than the cost of production. The greater the quantity

of production the lower the cost to produce each unit, and the lower this cost the wider the field you can reach with your goods and the better you can meet competition. It is a case of to him who hath—production—to him it shall be given—to produce. The converse is also true; the cost of one pickle per year, produced in a $100,000 factory would be such a luxury as to interest even Lucullus.

Handicaps to American World Trade

1. *Disregard for Ultimate Costs.* Perhaps one of the greatest economic lessons America has to learn from Europe is that first cost is not last cost—that the cost per year to the consumer—be it boots or buildings—is what determines the value of a product and the real output of each productive unit. European buildings are built of brick, stone, and stucco. First cost is high, but think what the inhabitants save on insurance, fire departments, and repairs in 500 years. The British advertise stout boots, stout clothes, and stout hats. Imagine an American woman buying a stout hat! Letters are printed from earls showing that a rain-coat has been returned to be rain-proofed again after five years' hard wear in the English climate. In America, an $18-a-month clerk buys a new coat every year. The sides of railroad cuts in France are completely faced with stone. We keep a gang of high-priced men repairing ours as the earth washes down after every rain. The railroad from Cologne to Berlin is laid with metal ties. Bridges along the highroads of Europe are of permanent construction. We have just begun the construction of concrete bridges. You can buy bicycles in England with a permanent guaranty. European automobiles are better the second year than they are the first and are in excellent condition when twelve and fifteen years old. The American mission of which I was a member traveled all over Italy in such cars. They ran perfectly under conditions as severe as in any part of America.

The ultimate cost to the consumer—and that is what sells goods in the end—is less on an automobile that will last fifteen years than on one that will last two years. When in addition we consider that the former is manufactured by careful labor on cheap ground in an ancient building whose value has been written off the books for twenty years; and the latter, in a high-rent district of a big city in a fancy million dollar factory building by high-price labor on expensive machines which the manufacturer's vanity forces him to scrap every two or three years, Europe's industrial advantage may readily be seen. Our policy of "scrap it and buy a new one" results in our being, as a nation, the most stylish people on earth. We apply the rule to clothes, to houses and to factories, but it is the most expensive thing in our national life. It doesn't lower the cost of living and it is a handicap in the competition for world trade because other nations don't want short-lived manufactured goods.

2. *Standardization.* Another handicap to American world trade is standardization. We all wear the same kind of clothes, while abroad every country, every province, every town—almost every individual—uses everything from his clothes to his traveling bag as a means of self-expression. I have seen men with pantaloon straps—such as Uncle Sam wears in the cartoons—in the French provinces. I have seen farmers at market in England in costumes which would head a procession of hooting small boys if displayed in Elmira, New York. I have seen old ladies on the Continent with assortments of luggage that could have been perpetrated only by the eccentric individual herself in collusion with the village harness-maker. A man breakfasting in lavendar pajamas in an Italian restaurant provokes no comment and, queer as my American clothes must have looked to the peasants of the remote districts of Touraine, they never looked at me—much less stared or pointed. Mass production—standardiza-

tion—such as we can put over in America where the millionaire, as portrayed by the movies, is the fashion-plate for our clerks and the female of the species sets the pace for the shopgirl—makes for low first cost. When, on the other hand, the purpose is to please a foreign market, people unused to reduction to a common denominator in a melting pot that makes one man, and especially one woman, as good as another as regards clothes and personal accessories, standardization presents a problem.

3. *Ignorance of International Trade Customs.* One of our worst handicaps in the race for world trade is our weakness for what the British call "window dressing." We are so used to putting our most beautiful apples on top of the basket and to manufacturing our sample shoes in special lots, that it pains us dreadfully to be accused of the Yankee tricks of our ancestors who sold wooden nutmegs and basswood hams. More than once while traveling in the North Country—that black manufacturing district which is the real England—I heard the expression—"Isn't that just like a damned Yankee!" Before I left New York I had been told by the vice-president of one of our greatest banks that the American manufacturer was considered a crook all over Europe because the goods he delivered weren't up to sample, while the samples submitted by Italy, France, Germany, and England represented the average, or below the average. I ran across the trail of this sort of thing all over Europe. The American manufacturer averages as honest as any in the world, but he must learn world trade customs if he wishes to be valued as he deserves.

4. *High Cost of American Labor.* America—under the lesson of the late war—invested heavily in a mercantile marine and built shipyards widely. A foreign trade corporation was organized early in 1921 to help countries with depreciated currencies buy our goods by means of a plan providing for the

application of the principles of barter without its inconveniences. What, then, is to hinder the pursuit of this plan?

Just this—at current rates of exchange a skilled mechanic costs $45 a week in America, $14.70 a week in England, $8.31 a week in France, $5.47 a week in Italy, and $4.68 a week in Germany.[1] In the United States our skilled workman is operating from four to six automatics, in England from one to three, in France from two to three, in Italy from one to two, and in Germany from three to four. Even if we assume that workmen abroad produce only half as much as our own, there is still the handicap of our wages which are from three to nine times higher than those abroad.

Our usual defense against the dumping of cheaply manufactured foreign goods has been the erection of a tariff wall. At present such a course would result principally in making it impossible for Europe to meet her debts to America, since the only way she can pay up is to ship us manufactured goods or from the profits on goods sold to others. This last means at present securing a large part of her raw materials from us. If she secures it elsewhere we lose the profit on raw and semiprocessed materials as well as employment for cotton-raisers, miners, etc. We in the United States are perhaps the best equipped of all the great powers to sustain ourselves without traffic with others. Not even we, however, can do so without making it impossible for our debtors to pay us and without disrupting banking, transportation, and the thousand and one industries employing millions which are dependent upon the maintenance of international relations. Splendid isolation is an iridescent dream. It is futile to preach the avoidance of entangling alliances now. We are already entangled. The eggs were scrambled when the steam engine changed us from agricultural to industrial nations — and we can't

[1]The actual prices paid are 85 shillings a week in England, 132 francs in France, 150 lire in Italy, and 360 marks a week in Germany. Return to normal exchange will correct a large part of this discrepancy.

unscramble them. Russia has had a taste of splendid isolation. She has had to go back to the farm and even though she is 85 per cent agricultural the effect has been most painful. Imagine what would happen if the inhabitants of New York, Manchester, Paris, Milan, and Pittsburgh had to raise their food and fuel in their back yards or perish. The life of a hermit is possible if you live on a farm and produce pigs and vegetables, but should the workers in the mines and in the steelmills decide to become exclusive and subsist by consuming their own product the least they could expect would be a severe attack of indigestion! We tried to keep out of war. We tried to prevent influenza from reaching us. The world is an industrial entity. The life of the whole is dependent upon the health of each part and upon the co-operation of those parts, each with the others.

Rejuvenated Industrial Europe

England's expedient to keep her manufacturers and her workmen up to the mark has been to give wide-spread publicity to the activities of her competitors. Her papers scarehead what is going on in industrial America and in industrial Germany and print the accounts of murders and holdups on the inside pages. Just before I left London, all the papers were commenting editorially upon England's loss of a large sale to Germany. South America had called for bids on a gas plant. The lowest British bid was £162,000 with three years' delivery. Germany got the business with a bid for £90,000 and three months' delivery. A little later American steel makers underbid the British on a Welsh job. The English papers were full of it. Furthermore, every technical magazine is filled with accounts of German and American methods.

The older generation of manufacturers it is true are as ready to explode at the mention of "American enterprise" as you would be if your wife had tried to reform you at sixty

by quoting morning, noon, and night, the virtues of your next-door neighbor. But the young ones are learning. They know all about scientific management, mass production, and American machine tools. Germany, France, and Italy are equally interested. In traveling about it was often difficult to secure information because manufacturers, business men, and university professors kept me talking on American methods and the methods of other European countries. They weren't spending their time telling each other how good they were. They weren't fooling themselves with any dream of splendid isolation. They were out for the information and they were thinking in terms of international affairs.

America's Problem and Its Solution

Our problem over here is to keep our industries in operation, to keep our labor continuously employed, to make it possible for all of us to pay our bills and to maintain reasonable earnings from the invested capital of America. We have a mercantile marine and we require an international market for our surplus products. We have a rejuvenated industrial Europe to face. We are fat and prosperous and lethargic. Our competitors are poverty-stricken, lean, and ambitious. European labor has gone back to work, at prices which our present rate of exchange makes it seem hopeless to compete with. It is no use talking about avoiding entangling alliances. Industry and commerce are international and since we are an industrial and commercial nation the ruin of Europe means the ruin of America.

The remedy lies in the encouragement of such measures as will drive exchange back to normal and restore the economic balance of Europe. It lies in an emergence on the part, not of the intellectuals but of the common people who elect our presidents, from the self-satisfaction of the provincial into the open-mindedness of the cosmopolitan. It lies in the popular

study of European conditions, methods, and peoples. It lies in intelligent travel upon the part of our business men and in the progress in the art of international thought and negotiation, which only knowledge of world facts gathered at first hand can give; and in the firm resolve on the part of every unit in the vast industrial organization, which is the real America—from the last-hired workman to the widow who owns a single share of stock—to assume personally the responsibility for the success of our enterprise. If we will do this there is no question but that our country will assume, and that she will hold, the leading place in international trade competition to which her native abilities and her natural resources entitle her.

CHAPTER II

EUROPEAN AND AMERICAN BUSINESS METHODS

Influence of Precedent in Europe

In America there is a tendency for each millionaire to improvise his own executive and business methods as he piles up his million. Thereafter this material proof of his success remains a monument to the correctness of the said methods and a personal tribute to their author. Of course, it is quite possible that he might have made two millions if he had adopted other methods—but such thoughts are disturbing—a man shouldn't be a hog anyway, he reasons—and a million ought to be weighty enough proof of success for any practical man.

Abroad—in France, Italy, Germany, and England—business methods are more in accordance with precedents developed under centuries of business negotiation. Trading with countries widely different in race, customs, and morals has made an exact method of procedure necessary. Words must be more carefully chosen and consideration must be given to the effect of each sentence upon the mind of the hearer when his historical and national environment is taken into consideration. In England the word "bloody" is so awful a term that all London gasped when an actor dared to utter it on the stage and the next daring author who attempted to interject it into a play was promptly suppressed by the censor. A college friend of mine informed a group of German school girls that "he guessed he was the goat," and it was only after they had been shooed to safety by a horrified chaperone that he realized that he had announced that he was a particularly loathsome and unmentionable sort of roué. The head of a

great university spent a quarter of an hour, as we walked up and down his garden after tea, telling me exactly what happened in the mind of a serious Englishman, athirst for knowledge, when he opened an American textbook and found such a ribald expression as "any foreman who would treat a man that way, ought to have a brick bounced off his bean."

Use of Words

An Englishman returning recently from America complained in the *Times* that the famous Americans—authors and the like—whom he had met, were uninteresting conversationalists because they described all their experiences in slang stock phrases—either they all "worked like hell" or things "hurt like the devil" and everybody he met talked just the same way. The first time I came into contact with English business men to any extent, I was seriously embarrassed to find to what an extent just such stock phrases came to my lips. I was continually censoring myself and enduring all the embarrassment a cowboy might undergo who tried to talk like a Harvard instructor. The English business man—and the same is true in France, Italy, and Germany—says exactly what he means, selecting the word which will convey the exact shade of meaning desired with almost as great care as that which is displayed by a lawyer drawing up a contract.

Furthermore, the European business man has a good deal better idea of the effect his words will have upon the hearer—and of what the recoil will be—than has the usual American business man. If we don't produce the desired effect the first time, we try again, until we get the range, or if we miss our quarry we know of another prospect just as good. The difference is between a hunter armed with a twelve-shot automatic in a forest where game is plentiful and a man armed with a duelling pistol, for which he must exactly

weigh out powder and shot, alone with a single deer on a desert island. A number of years ago a man in control of a large corporation made a trip into Canada to renew some important agency contracts. Two days later he returned sweating blood and wiping his brow at the nearness with which disaster had overtaken him. "I thought I'd throw a scare into them at the start by telling them all the rotten things they'd done to us this last year and then make a grab for better terms before they came to. But I'm damned if they didn't think we wanted to quit doing business with them and it took me two days to bind up their wounds and get 'em where we had 'em before."

Business Negotiations

It is only recently we have ceased to be proud of shirt-sleeve diplomacy. Instinctively our virile American business man hates knee-breeches, red ribbons, and monocles. We still scorn the finer arts of business negotiations. We like to bull it through by sheer force of personality. That is so much easier than to think the whole thing out beforehand, taking into consideration the likes and dislikes, the historical background, and the racial psychology of the foreigners with whom we are to deal. "Rough and ready," that's our motto.

I saw some of that rough-and-ready stuff at the organizations of an international trade board in Paris. The majority of the American delegation didn't know French. When an Italian made a speech he made it in French and all the Belgians, Frenchmen, and Britishers understood it and had their plans laid about the time the interpreter had blundered half-way through what passed for a translation. As a result the American delegation was left at the post whenever it seemed desirable. When an American made a speech more than likely he indulged in what the British chairman referred to as

"picturesque Americanisms," the sort of stuff that has "pep" —that we like to hear and applaud our public speakers for. As a result the interpreter was often aghast when we finished one of our speeches and the whole meeting had to go into executive session to decide just what we did mean and to get it translated into French.

When it came to the interpretation of parliamentary law, we found out which nations invented parliaments and which nation was new to that form of government. The British could slam a motion onto the table and indulge in three asides and two caustic rejoinders before the American chairman could get his throat cleared. And many times, when we brought in a resolution—something which in all innocence we believed would do the effete nations of Europe worlds of good—we walked on seventeen varieties of pet corns we didn't know existed. It required endless tact on the part of our delegates who were internationally minded to calm our confrères to the point where they could keep their hands below the level of their shoulders and to convince them we weren't trying to wreck the peace of Europe. A celebrated English editor whom I met in the National Liberal Club in October likened the negotiations between the American and European delegations held during the formation of the League of Nations to a poker game in which a callow youth with high ideals went up against a bunch of experienced and hardened players who knew not only the game, but the cards and each other's tricks, histories, abilities, and personal peculiarities. "There could be only one result," he said, "and now the old players are howling to heaven because the parents of the rooked young man won't pay up." If we are to win even a place in the International World Trade Handicap, we must learn the game. A Frenchman isn't crazy because he wears a beard and gesticulates and it is a safe rule to follow that an Englishman is never as big a fool as he looks.

Thinking Problems Through

A short time ago the head of one of our largest banks told me that thirty years' experience with American business men had convinced him that our greatest fault is our failure to think our problems clear through. "We think them through to a certain point," he said, "and then jump to a conclusion. Such procedure is responsible for a large percentage of our business disasters."

Last fall it happened that I traveled from Manchester to London on a luncheon train. The journey took about three hours and during that time the men who occupied the table across the car from me were preparing for certain business negotiations which were to take place the next day. They first wrote down on a piece of paper the points they wished to make. Then they discussed these points to the last detail and made notations of the more important. They then considered what the other parties to the proposed deal would be likely to say and devised ways and means of meeting every possible move. They then discussed their strategy—the order of presentation most likely to produce the effect they desired. Next they reviewed the whole thing, and finally the man who was to be spokesman gave an oral rehearsal of what he was going to say, to be sure that he was letter-perfect and in order that the other men might criticize him. I have prepared for a good many business deals but I have never before encountered such thorough preparation as those men went through. Under the circumstances, failure seemed almost out of the question.

An interesting episode occurred during the above discussion which illustrates another characteristic of European business life. About an hour after the consultation occurred the train passed through the most beautiful section of the Peak district. Instead of casting an eye out of the window now and then and interpolating an occasional remark about

the scenery into the business conversation—which would have resulted neither in full enjoyment of the rocky glens nor of complete attention to the business in hand—one of the Englishmen said, "Suppose we look out of the window for a few minutes." They thereupon were silent for fifteen minutes. Then, after their rest period, they again gave their work their undivided consideration. As a general rule your European business man believes in giving his full strength to whatever he is engaged in, whether it be a business deal or a pleasure trip.

Talking Business During Lunch

Salesmen who have done business with Englishmen even in Canada for the first time often come back with stories of how they created a bad impression upon their customers by attempting to talk business during luncheon or dinner. The custom of inviting a man out to lunch and then making him work his brain while he consumes your food is probably one of the most reprehensible habits American business usage has developed. It is not only an insulting form of bribery—since it implies that he is willing to sacrifice his backer's interest to a paltry donation of food—but it is inefficient. Either he enjoys and digests the food, giving scant heed meanwhile to your proposition, or else he uses his brain during the meal and later functions at loss of power during the attack of indigestion which inevitably follows. No time is saved by doing business during a meal and then running at half-speed all the afternoon. We are a nation of dyspeptics. The usual American of forty-five looks about as old as a northern European at sixty and luncheon conferences play their part in our premature decay. Whenever you begin to think that you must work while you eat to become a Napoleon of finance, it is well to reflect that an attack of indigestion was responsible for the loss of Waterloo.

Working Hours in England

We are somewhat prone to laugh at the Englishman's office hours—ten to one and two-thirty to four-thirty or five—and at his week-ends in the country. And how we scream with merriment at the idea of afternoon tea ever being introduced into our own virile, masculine American offices! While our waist band is still intact, it is well, however, to restrain our cachinnation sufficiently to reflect on the ribaldry caused by the wearing of a wrist watch three years ago. We are learning fast but we haven't yet learned to specialize in the employment of our time. We are prone to demand admiration because we pretend to begin work at eight-thirty or nine and stay in our office until half-past five, with a business conference for lunch. If you don't believe an Englishman concentrates harder on his work while he works, or on his play when he plays, just try to talk sport to him during working hours or to talk business to him while he is enjoying his afternoon tea.

Furthermore he guards his time very much more carefully than the average American business man. The appointment system is used to the fullest possible extent. If you want to see a man of any consequence anywhere abroad you must either write him or phone his secretary. You are then told when to come and you are quite likely to learn at the beginning of your talk the hour of his next appointment. If you do not complete your business in time allotted, a second appointment is arranged. There is no stimulant to the omission of irrelevant details and to keeping well to the matter in hand equal to the knowledge that in exactly twenty minutes the next man will arrive and your time will be up. As a result, an amount of business can be done in a short time which is little short of miraculous to the man who is used to taking his time about things because he has all day in which they may be done.

Neither are week-ends in the country all pheasant-shooting, golf, and light conversation in the baronial hall. If you don't arrive with a secretary loaded down with dispatch-cases you will probably be lonely. At dinner you will see all the guests in the house, but if you haven't letters to write, reports to prepare, or conferences to hold in your room, you are likely to have the baronial hall to yourself most of the time. Week-ends abroad are an opportunity to do clear thinking, free from interruption—not a round of hectic entertainment which sends you back to town hating your hostess only a little less than the work before you.

Office Hours in France

In France the morning hours are used by business men in various ways. Some men arrive at their offices very early in the morning. You can generally count, however, on finding them in from about ten until a little before twelve. Luncheon is taken very seriously. The business man generally goes home to his family and follows the meal with a siesta—as was long the custom of the Rockefeller associates—or with a walk in the garden. By two-thirty you will begin to find men in their offices again and you can count on doing business until seven o'clock. This is at first rather hard on the American business man who has been compelled to substitute a continental breakfast for his regular ham and eggs and a stack of wheats and who hasn't yet accustomed himself to beginning lunch with a couple of pounds of hors d'oeuvres. Business talk of a highly concentrated sort, flavored with the sauce of strange surroundings and the chance of misunderstanding due to different mental processes, is a pretty poor substitute for food along about half-past six, and if you stagger out with any very clear idea of what was said from then until seven, the first few times you try it, you are more versatile than most Americans I have met.

Food and Work in Germany

The present German system of mixing food and work resisted my most earnest attempts at solution. When we drove out to the Country Club on Sundays, my friend the Kommerzienrat carried a small paper suitcase filled with sandwiches of various sorts. At intervals he or one of the children would remark, "Well, I think I could eat something." Whereupon the suitcase would be opened and all who so desired could put away a small portion of cheese or ham encased in brown bread. Sometimes these inspirations arrived at half-hour intervals and sometimes it would be a couple of hours before the divine afflatus would descend. But wherever we went—by motor, launch, rowboat, or on foot—the paper suitcase always accompanied us. When I went through a factory very often no one would think to eat from seven o'clock—when I had a very continental breakfast at the Adlon—until along about five in the afternoon, when we would be driven in desperation to some big restaurant on Unter den Linden and would there gorge ourselves until our eyes bulged from their sockets. The office force seemed to have a very appetizing meal in dining-rooms attached to the works somewhere around noon and we generally inspected the kitchens about the time our belts were drawn up to the last hole. The working hours of directors and high-class business men seemed to follow those of the English very closely.

The German Executive

The personal efficiency of the German executive is exceedingly high and military discipline is the key-note of his staff. He is more likely to go in for art or music as a recreation, however, than for golf, so that he loses his shape perhaps even sooner than we do. Perhaps the highest example of personal efficiency to be encountered in Germany is that of the Direktor of a very large motor company. This company,

which is somewhat on the order of our General Electric Company, employs over 100,000 men. The Herr Direktor —whom you see only on appointment and after the presentation of eminent credentials—occupies a room perhaps 30 feet square, equipped with a large mahogany desk. He is most cordial and shows you the standard form upon which all reports come to this desk. When the report has been digested, he notes his orders thereon in the space provided and drops it through a slot in the top of the desk which leads to the room below, filled with the various secretaries trained to do his bidding. If there are certain points to be taken up with his lieutenants the report is placed in the proper basket located in the right-hand leg of his desk and at a certain scheduled hour in the afternoon a department head arrives and a conclusion is reached—after which the report pursues its course down the chute according to the usual routine manner.

The perusal of those reports requires concentrated attention on the part of the Herr Direktor in order that the most advantageous decision may be reached. This means that there must be no interruptions. To that end, when he desires isolation the Herr Direktor touches a single button and presto —all doors are automatically locked and—lest some incautious neophyte might rattle a door handle or turn in a phone call—a red light is displayed outside each door and on the operator's switchboard. In case, however, of dire disaster or a momentous crisis in some department, it is possible to drop a ticket—colored in accordance with the department in peril—into a glass box near the door. This informs the Direktor that his attention is desired, although not demanded, upon matters pertaining to that department and allows him to use his own judgment as to whether he shall remove his attention from the particular business in which he is immersed at the time.

Military Discipline

When the head of a large German concern gives orders to his subordinates the assistant does not lean against the wall, or puff at a cigarette, or say "huh?" when the Direktor gets through. He doesn't even say, "Wouldn't it be well to consider, sir, doing it in this way instead." The subordinate —even if he be of very high rank himself—stands with his toes out and his heels together with an invisible ramrod down his back and his eyes fixed on his chief's face with an expression of the most intense intelligent attention. When the chief's orders have been rapped out—one word after another like bullets from an automatic—he says, *"Ja wohl, Mein Herr,"* makes a quarter turn left, and marches from the room. And after you have seen the German apprentice schools, with every youngster frozen solid to attention when you enter the room, you know that that assistant went out and split up the chief's orders, and communicated them to seven or eight of *his* subordinates—who themselves stood to attention and after in turn saying, *"Ja wohl, Mein Herr,"* passed on the word to *their* subordinates until almost before the splash made by the orders of the big chief had subsided in the center of that great lake of an organization the little ripples were lapping up on the distant shores and things were being done without question as the murmurs of *"Ja wohl, Mein Herr's"* died out among the far boundaries of the industry. Military discipline is great stuff for getting things done, but you want to be careful what kind of a rock you heave if you're the boss.

Paternalism in France

In the same type of industry in France, paternalism would be the note. French business is founded upon this and upon making certainty sure. People new to this insistence upon conducting business in such a way that there can be no doubt about exactly what was done during each step of the trans-

action and to the demand of proof of character and stability before negotiation, rashly conclude that the French are so dishonest and so suspicious by nature that they won't do business with each other or with an outsider without documentary proof to the *n*th degree. One disgusted business man with whom I foregathered at a small table in front of the Cafe de la Paix even went so far as to insist that the vanished red trousers of the poilu had been converted into tape for the confusion of visiting Americans. Be that as it may, the French business man doesn't take any chances.

If you rent an apartment it is carefully specified that you are to return that apartment when the lease expires in exactly the same state as you find it. If you drive a tack in the wall you must remove that tack and fill up the hole. If you paper the drawing-room with pink cupids you must remove said cupids and replace the dingy brown paper you found there—no matter how much more desirable pink cupids may seem to you, because—Monsieur reasons—the family of old maids or the curé who follows you as tenant may not care to have *la vie d'amour* continually and insistently called to their attention. When you stop to think of it, this is logical reasoning on the part of the landlord and in the long run increases the return on his investment. If you don't like the fittings which have become customary in France, you can change them but you've got to put everything back as you found it when you leave. The French are nothing if not logical.

Banking Procedure in France

If you want to experience French safeguards in their pristine purity, open an account in a French bank. As soon as you have learned to pronounce its name clearly enough so the taxi-driver will take you there instead of to the railroad station, enter the marble portals and accost one of the elegant bemedaled functionaries who gesticulate in the shade of a

magnificent onyx column. During the polite silence which immediately follows, your nationality is diagnosed with the result that the most junior dignitary present is dispatched to *cherchez Henri.* Presently Henri arrives and addresses you in a cockney accent acquired while driving a truck in Whitechapel and fitting himself thereby to act in his present interpreter-financial capacity. You are then politely conducted to *la salle,* which looks like the waiting-room of the old Kansas City railroad station, except that it has counters along the sides. Henri shows you how to fill out a blank which requests information of a most surprising nature, and eventually you exchange it for a number printed upon a pink slip of paper. Then you find out why *la salle* looks like the waiting-room of the Kansas City station.

For the subsequent half-hour Henri entertains you with his experiences during the war and philosophizes upon human nature and the characteristics of nations. He then informs you that the bearded gentleman who has been giving an imitation of an old-time train announcer is approaching your number. You move up to a window and after a lengthy converse with another bearded gentleman with a ribbon in the buttonhole of his frock coat, Henri informs you that you are quite correct, there is money belonging to you in the bank, that in about three days you may call and secure a check book with your name printed on each check, and that thereafter your signature will be honored as long as *la bureau centrale* is convinced that you have money on deposit.

In about three days you return, Henri is again sought, and upon presentation of your signature you receive another pink slip, you occupy *la salle* for half an hour and when your number is called you receive an elegant embossed check book, about as big as a cedar shingle, with your name carefully translated into French printed on each check. You then request a ruling from *la bureau centrale* as to whether you

shall write your name in French or with the spelling bestowed upon you by your parents. Eventually you are granted permission to retranslate your name into English each time you draw money and are at last ready to write your first check. The procedure thereafter is comparatively simple. You have become acquainted with Henri's lurking places, you know how to write the check, affix the stamp, and where to get a pink slip in exchange for it. You can eventually—if your stay be long—recognize which hundred the station master is beseeching to come forward and finally *la bureau centrale* has become used to your signature. It then takes you about half an hour each time to draw your thousand francs—but the system is absolutely tight. No one can get your money and you can't get any of the bank's money. *La bureau centrale* is backed with complete information and nothing is left to the memory of Charley, the paying teller, and consequently no one has to pay for the mistakes which cost money under our system and which eventually are charged to the bank's customers.

Visits to Industrial Plants

A visit to a factory in France is quite as much of a ceremony. I desired to see a certain great steel plant which employs something over 100,000 men and makes everything from electric motors and automobiles to big guns and battleships. On Wednesday, therefore, I looked up the address on the map and told the taxi to drive to La Madeleine, which I happened to know how to pronounce. After a few blocks an immense gray stone building with a mansard roof hove in sight. In a marble hallway at the end of a turkey red carpet stood a huge shell which glittered in the dusk. In a hallway to the left sat a grizzled *concierge*—resplendent in gold lace and medals. To him I presented my letter of introduction to the director. This resulted in elaborate directions, amid which I detected the mention of the third *etage,* which bitter

previous experience had taught me was the fourth floor. Dodging the *acenseur,* which further previous bitter experience had taught me did not usually understand my French and so was more inclined to stop between floors than at a point compatible with a dignified exit, I climbed three flights of stairs, and after the requisite number of turns encountered another gold-laced functionary who led me to a room very much like one of our board rooms except that the walls were lined with books and the table equipped with photograph albums. I foresaw a long wait.

In quite a short time, however, a venerable man entered, shook me by the hand and addressed me in French. From the simplicity of his clothes I might have taken him for an ancient retainer or one of our own multimillionaires, but one glance at the broad brow and features worthy of Leonardo da Vinci himself convinced me that I was in the presence of one of the leaders of French industry. After a few words of conversation in which he had very much the advantage of me, I was invited to attend a special cinematograph exhibition with him. For two hours we sat with a secretary and a half a dozen heads of departments and saw battleships launched, great guns in action on the Somme front, machine shops in operation, and various sorts of welfare work carried on at the plants. At the end of the show I was invited to attend a second exhibition the next afternoon. At the end of this performance I was turned over to the engineer who has charge of all the industrial engineering work in the establishments. Along about seven o'clock I was informed that if the War Department were favorably inclined I would receive a letter about Saturday. On Saturday morning there arrived by post a formal invitation to proceed to my destination by the fourteen o'clock Sunday train and to put myself in the hands of the chauffeur who would meet me at the station.

About twenty-two o'clock the local on the little branch

line drew up at the station and I descended from the once elegant but now delapidated and blood-stained first-class carriage and was saluted by a blue and uniformed individual standing in the shadow of a large red limousine. We whirled at once up steep stone-paved streets, past roaring blast furnaces to the gates which guard the wing of the chateau reserved for guests. Here were more red carpets, gold lace, and salutes. After traversing long corridors lined with English sporting prints and pictures of the Shah of Persia, the King of Spain, and the President of France, I was assigned to a sleeping apartment, a private dining-room, and was turned over to certain skilled servitors who would make the most polite head waiter at the best New York hotel look like a biscuit-shooter in a Barbary Coast beanery. I was also presented with a map and photographs of the town and of the factories, hospitals, etc.

At eight o'clock Monday morning there was a clanging of gates, the whir of a motor and amid low bows on the part of the staff there arrived the Director in Charge of Receptions with his retainers. He is one of the most splendid gentlemen I have ever encountered—military carriage, carefully waxed blonde mustache, monocle, red ribbon in immaculate buttonhole, ivory-headed cane dangling on a wrist strap, and a train of secretaries with portfolios behind him. After certain highly gratifying exchanges of compliments we went into executive session. An interpreter and a limousine were assigned to me and a schedule was worked out. At such an hour the superintendent of the locomotive shops would receive us; at such an hour we should be at the steel plant; at one o'clock on Monday the chief engineer of the A group of plants would lunch with me and on Tuesday the chief engineer of the B group. On Tuesday afternoon we would inspect the hospitals and later the old folks' home and the schools. And as it was written, so it transpired.

We drove furiously from plant to plant. Gates in the stone walls flew open at our approach, bemedaled veterans saluted us as we entered, and superintendents rode on to the next plant with us so that we might complete our conversations. The whole thing is typical of the French method of doing business—first be sure you are right, make every possible preparation, and then carry out the whole thing as per schedule at terrific speed. *"Verve"* is the only word that expresses the French in action, and once you have experienced it, you cease to wonder why the Germans didn't get to Paris.

The Italian Business Man

Your high-class Italian business man is the most charming gentleman in Europe. As a rule of splendid physique, he dresses in the utmost good taste and speaks purer American than anyone in Europe. For the most part he is somewhat new to business as it is done in America, large mergers and immense industrial units being the developments of the last few years in Italy. He is anxious to learn, however, and his interest in American business systems and in American office devices is at times almost touching. While he, like the Frenchman, is a Latin, the Italian is to the business man of France what the charming southern gentleman of the old school is to the strenuous inhabitant of our industrial North. He is astute enough, but in matters of organization and of performance as per carefully thought-out schedule, his climate makes him so much of a gentleman that he sometimes scorns to connect—when connection means "undignified hurry" or "pushing commercialism." With his workmen the Italian's manner is somewhat that of an old-time duke with his subordinates. Superficially the subordinate receives gratefully whatever is handed out to him but after dark he is inclined to relieve his feelings by scrawling *"Viva la Sovieta"* all over the walls of the village.

Itinerary in Italy

I went to Italy as a member of a commercial mission of twelve. We were guests of certain national Italian commercial organizations and of the Italian government. We traveled in high-powered motor cars and special trains and were shown so much of industrial Italy in two weeks that we averaged about four hours' sleep per night. The governor of the province with a delegation of distinguished business men received us in the royal red-carpeted waiting-room regardless of the hour at which we arrived in each provincial capital. We had a grand fiesta at Venice and we were banqueted at the Lido, at Porte Fino, and the Villa d'Este. Restrictions as to the consumption of cakes were loosed for our benefit and motors brought princesses and rare collations to remote industrial districts so that we might lunch amid historic settings with all the delights which reach their most perfect flower in an old and a high civilization. Considering the ambitious nature of the program, the short time for preparation and the difficulties to be encountered in a country only just rewon from the conqueror and even then in the throes of serious labor troubles, it was remarkable that the only contretemps were those due to a desire to show us too much territory or to accede to the most inconsequential whim expressed by any member of the party. Where an Anglo-Saxon will shove you into the first car at hand and call out, "come on, get started, folks!" the Italian will stand bowing and interpolating "*gratzia*" and "as the Signor desires" for thirty minutes and then run you through every village at fifty miles an hour and around every corner on two wheels to make up for lost time. The result is the same; the Italian method is more picturesque.

As in the case of the French, but to a more marked degree, great adroitness and marvelous dexterity at high speed replace the careful planning and the plodding, calculated advance of the Teutonic business man. Vivacity and gay vociferousness

must not be mistaken for lack of common sense by the Anglo-Saxon worshipper of strong silent men. Neither does versatility mean vacuity. A certain Italian gentleman of our party could not only keep a banquet table in roars of laughter, discourse learnedly upon the relative merits of Botticelli and Michael Angelo, race a train down the station platform with his arms full of bottles, drive an aeroplane, or tango with the ladies down the corridor of a special train at midnight, but he could diagnose the psychology of his market for building material and personally direct construction work so skilfully that he was able, though hardly thirty, not only to support his family but to own motor-cars, art treasures, and country villas.

Need of Studying Foreign Business Methods

America is now a world power and owns a mercantile marine. We must do business abroad increasingly as the years pass. To do this we must understand the foreign business man and his methods. The art of negotiation is not a game for amateurs. Provincialism must give way to finesse. We must learn French. We must learn to say exactly what we mean. We must replace good intentions and a weakness for aphoristic ideals with a knowledge of racial psychology and historic likes and dislikes. We can't afford to hate foreigners because they don't understand us. *"Je suis Americain"* must cease to be a preliminary to ingenious gaucherie and must become the sign of the man who thinks and functions with the suavity and diplomacy of the citizen of the world. We must not be satisfied with making the United States the greatest country in the universe in our own eyes and in the eyes of visiting foreigners. We must learn to create that opinion wherever our ships and our industries lead us. This will require an understanding and knowledge of the races and habits of thought of the world, and the first step is the study of European business and industrial methods.

CHAPTER III

ORGANIZATION

Industrial Consolidation

In 1914, Englishmen were very much exercised over the local appearance of trusts and monopolies. They foresaw in them the downfall of that bulwark of the nation—the independent shopkeeper. In 1920, Europe's industrial consolidations dwarfed those of America. The same thing has happened in England, Italy, France, and Germany. Outside of the steel trust our largest industrial consolidation is perhaps the General Motors Corporation, operating 45 factories and employing 85,000 men. The Ford plant with 50,000 employees is probably our largest single plant.

Italy. In Italy the Ansaldo Company, engaged in shipbuilding, machine work, general steel fabrication, and airplane manufacture, employs over 100,000 people and is capitalized at 500,000,000 lire. The Fiat Company—manufacturing automobiles, tractors, and camions, employs over 25,000 men and possesses the largest motor car factory in Europe, one building of which contains 1,500,000 square feet of floor space and supports a trial speedway 1,300 yards long. The S. I. P. E. chemical plant—probably the largest which survived the war—is a quarter of a mile wide and over a mile and a half long. The Ilva steel companies (see Figure 2) are capitalized at 300,000,000 lire and include iron, manganese, and lignite mines, blast furnaces, electric furnaces, factories for the manufacture of refractories and cement, marine and other engineering works, hydro-electrical plants, and a steamship company. The Italo-American Navigation Company is capitalized at 40,000,000 lire, and the Port of Genoa at over 30,-

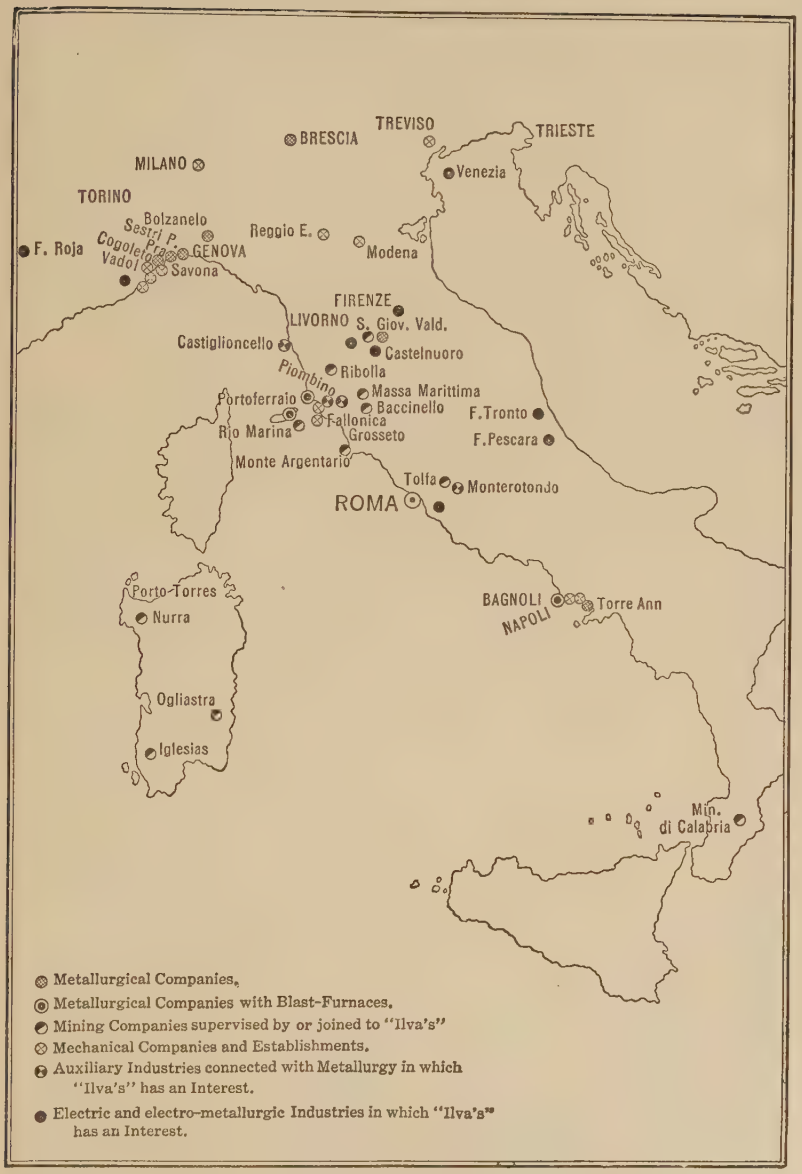

Figure 2. An Italian "Vertical Trust"
Establishments of the "Ilva" Company, Ltd.

000,000. The Franco Tosi turbine plants employ 7,000 people and the company is capitalized at 80,000,000 lire. The Romeo Company, which manufactures engines, air compressors, etc., grew so rapidly during the war that it is now capitalized at 50,000,000 lire, as against less than 1,000,000 before the war. The Rossi cotton factory and the De Angeli cotton-print plant each employ over 6,000 hands and the Cantoni factory 5,000. The Pirelli rubber factories employ over 13,000 men and women and the Breda locomotive plant employs 8,000.

A consolidation of some ten power companies has taken place recently representing the larger part of the hydro-electric power which Italy already has developed. One power company is capitalized at 50,000,000 lire and produces over 207,000 kilowatts, another produces 48,000 kilowatts, another 52,000 kilowatts, and another 30,000. One plant in the Dolomite Alps will be developed to 350,000 horse-power by 1927, which will make it the largest in the world except for Niagara. Italy is working toward the development of 5,000,000 horse-power—from the Alps—whose melting glaciers furnish an abundance of water all summer and from the Apennines whose rainy slopes furnish water during the winter. It is estimated that altogether 15,000,000 horse-power could be economically developed in Italy.

France. In France the Schneider establishments (see Figure 3) in which everything from steel to battleships and automobiles are manufactured, employ over 100,000 men. The company occupies some 17,000 acres of ground, of which 1,730 acres are actually under roof. These figures do not include the plants outside of France—such as the Skoda plant —in which the company is interested. The largest plant at Le Creusot—a city of 50,000—employs between 20,000 and 30,000 people. The Berliet plant, which is one of the most modern automobile plants in Europe, employs more than

Figure 3. A French "Vertical Trust"
Establishments Schneider

12,000 men. The Renault plant near Paris, manufacturing motors and tractors, grew from an establishment employing 4,500 men in 1913 to one of 22,000 in 1918. At present about 20,000 people are employed. France has already developed over 400,000 horse-power in hydro-electric plants and estimates that over 5,000,000 more can be developed in the Alps and more than another million in the Pyrenees region.

England. In England, Vickers, Limited, has consolidated with itself such concerns as the British Westinghouse until it employs more than 100,000 men. Its larger single units will some of them run close to 20,000 men. Lever Brothers, the soap manufacturers, employ 20,000 people in two plants alone, to say nothing of those employed in securing and transporting raw materials in South Africa and the Pacific Islands. Cadbury's chocolate plant at Bourneville employs nearly 10,000 people.

In England the Ministry of Transport is planning the construction of a vast hydro-electric power plant on the Severn and Wye rivers. By means of a series of dams and basins, tunnels, pumping plants, and turbines it proposes to make use of the tidal waters to generate 500,000 horse-power.

Germany. In Germany the Rhine Elbe Union employs 375,000 men and is capitalized at over 1,000,000,000 marks. It began with a consolidation of such concerns as the Gelsenkirchen Company (46,000 men) and the Deutsch-Luxemburg (45,000 men), which own coal and iron mines, blast furnaces, steelmills, coke ovens, tar and ammonia works, docks, ships, and motor-car plants. Later it acquired such plants as the Bochum Caststeel Company, the Rhenish Westphalian and Saxon electric power plants, Boehler Brothers steel plants and the Loeb motor-car works. Late in 1920 the Siemens and Halske Company (capitalized at 205,000,000 marks), the Siemens Schuckert Company (87,500,000 marks), and the Siemens Company of Nuremberg (235,500,000 marks) were added together with certain other electrical interests of considerable magnitude. The Krupp plant is capitalized at 175,000,000 marks and has been employing 55,000 men since the armistice.

These vast consolidations are directly the outgrowth of the war, when each country in self-defense was forced to reorganize its industries under government supervision. In

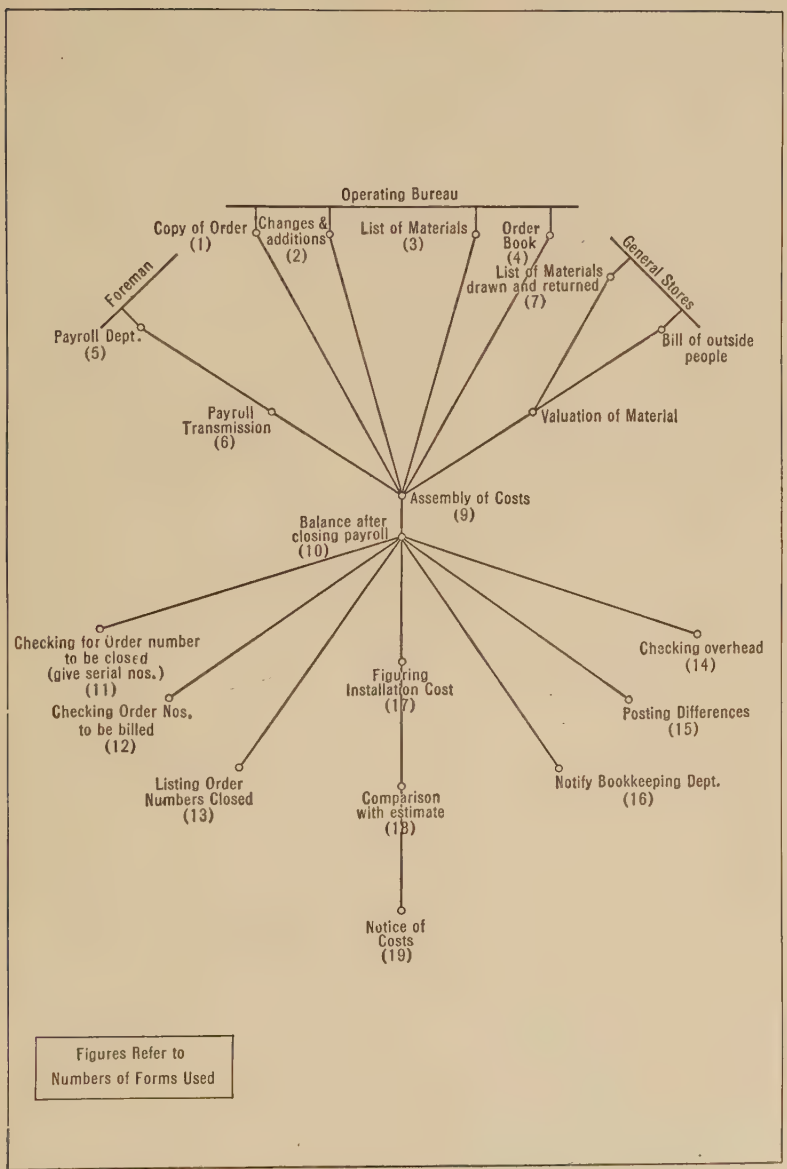
Operating Bureau
Copy of Order (1)
Changes & additions (2)
List of Materials (3)
Order Book (4)
List of Materials drawn and returned (7)
Foreman
General Stores
Payroll Dept. (5)
Bill of outside people
Payroll Transmission (6)
Valuation of Material
Assembly of Costs (9)
Balance after closing payroll (10)
Checking for Order number to be closed (give serial nos.) (11)
Checking Order Nos. to be billed (12)
Figuring Installation Cost (17)
Checking overhead (14)
Posting Differences (15)
Listing Order Numbers Closed (13)
Comparison with estimate (18)
Notify Bookkeeping Dept. (16)
Notice of Costs (19)
Figures Refer to Numbers of Forms Used

Figure 4. Path of an Order in Cost Collecting as Scheduled by a German Concern

America decontrol occurred almost immediately after the armistice. In England they were getting rid of their war control boards during the summer of 1920. But in Germany —where the stress remained acute longer—the war ministries were made a step in the evolution of industrial organization which is taking place. Although this was not the case in Italy and France, nevertheless the advantages of consolidation were equally manifest to all countries abroad, as is evident from the cases we have cited.

The "Vertical Trust"

The German movement is the best defined and the organization was systematic rather than a more or less haphazard development as in the case of the others. Furthermore, the German movement contains certain well-defined features—such as the vertical trust, the provision for mass buying for small industrial units, for organized research, and for the exchange of standards of production and the workmen's representation clauses, which make it unique. The vertical trust, as the name implies, is a consolidation vertically rather than horizontally as is usual in America, where companies manufacturing a single class of finished product—say automobiles or matches—are brought under a single board of directors. In the case of the vertical trust, besides factories for the production of finished cars there would be foundries, blast furnaces, iron and coal mines—in fact an organization similar to the one Ford in America and Berliet in France were working toward when they erected the blast furnaces in connection with their motor plants, or which the Endicott-Johnson Company had in mind when they evolved their "hoof-to-hoof" slogan to describe their activities in the manufacture of shoes.

This type of organization insures a steady market for the raw material and a steady supply of raw material for the subsequent plants, thereby increasing economy of operation

and stabilizing employment. To a considerable extent this same type have developed in the Schneider and Berliet plants in France, in the Ilva plants in Italy, and in the Lever Brothers plants in England, but these examples represent the individual initiative of one man or of a small group of men rather than a national development as in the case of Germany.

German Organized Economic System

Two engineers—Dr. Wichard von Moellendorf, Undersecretary of State in the Federal Ministry of Industry, and Dr. Walther Rathenau, son of the organizer of the A. E. G., are responsible for the German system of organization which is known as the "Planwirtschaft," or "Organized Economic System." These men organized the German industries for war production and are men of practical experience as well as of unusual ability. Their plan was developed before the armistice and purposed to organize all German industrial and commercial concerns into one vast trust in much the same manner in which a single multibillionaire who had purchased the plants in their entirety might consolidate them for economical operation. The scheme called for organization by industries—iron and steel corporations, textile organizations, chemical companies, and the like into twenty single trusts, each of which contained every factory of its class in the country—and for the fusion of all these specialized trusts into a single non-specialized All-German Trust.

The steps in putting this plan into operation were as follows:

During the war Germany established government control of industry—with absolute control of production, prices, and trade—just as did the allied countries. This was disliked by capital, but after the war the socialists forced its continuation, hoping that it might be the means to the development of state socialism.

After the 1919 revolution the radicals felt strong enough to discard such indirect means and a commission was appointed to consider the means of transferring the industries to state ownership. This commission, although under the leadership of socialists, declared the time was not ripe for radical experiment and socialization was killed—largely by the moderate socialists themselves.

The Organized Economic System was then brought forward as an alternative by Herr Wissell, Minister of Industry, who presented the plan to the Cabinet in May, 1920, as a substitute for socialism. Some such substitute appeared necessary in the face of the prevailing industrial anarchy and labor unrest and to repair by the avoidance of the pre-war system of wasteful competition the wastage of war.

This Organized Economic System provided for the formation of an All-German Trust composed of twenty subsidiary trusts organized by classes of industry which would—

1. Distribute and regulate raw materials.
2. Regulate production.
3. Increase productive efficiency by means of organization, standardization, and the elimination of wastes—in order to decrease the cost of production.
4. Organize sales with a view to the elimination of competition and middlemen.
5. Increase co-operation between employers and employees by means of national wage agreements and shop councils.
6. Promote scientific and technical research.
7. Provide special training for workmen.

The Federal Council of Economics

In the summer of 1920 the Federal Council of Economics (Reichswirtschaftsrat), which is a parliament of business,

was officially sanctioned by the German government. Such a council had been proposed years ago by Bismarck to sit equally with the Reichstag and to have charge of all financial, industrial, commercial, and labor matters. The worth of such a council was not proved, however, until the war, when the Ministry of Economics and Production (Reichswirtschafts Ministerum) was formed to control raw materials and food, to promote efficient production, to further research, and to devise methods to enable the small industries to enjoy the benefits of standardization and mass purchase by combination. Out of the brain of Bismarck then, from the exigencies of the war, from the demands of the disciples of Karl Marx, and from the product of German engineering training, was born the greatest plan for the government of an industrial people, by an industrial people, and for an industrial people, which the world has ever known.

Members of the Federal Council of Economics are elected, not as representatives of political parties but because each represents some business interest—capitalist or labor—or because he is a specialist in industrial, commercial, technical, or labor matters. The council is divided into groups varying in size in accordance with the national importance of the industry represented. The agricultural group has 68 members; trade, banking, and insurance have 44 members; gardening and fishing 6; communications and public undertakings 34; manual labor 36; the consumers 30; officials and professions 16. Twelve members are nominated by the Senate (Reichsrat) and twelve by the Cabinet from among citizens famous in business or applied science. It is considered a greater honor to be a member of the council than to be a member of the House of Representatives (Reichstag). Ex-Cabinet ministers and the mayor of Berlin are members, as are such captains of industry as Hugo Stinnes, Cuno, Walther Rathenau, von Siemens, and socialistic leaders like Karl

Kautsky. Half the delegates are employers and half employed, except for the nominated group.

The council's powers are almost unlimited, since they advise the government and propose all laws having to do with industry. Furthermore, they act as a check on ministerial decrees. Ultimate control rests, as in America, with the Parliamentary houses, but inasmuch as all bills must first go to the council, the opportunity for first publicity, invaluable in a democracy, rests with them. So far the Reichstag has bowed to the council's recommendations. The Federal Council of Economics controls all the subsidiary trusts, since the chiefs of these trusts are elected as their representatives to the Council. Representatives of the employees are appointed by the factory councils which the law of February, 1920, provided should be organized in every factory employing more than twenty workmen "to represent the employees' interests and to collaborate with the employers in the interests of general efficiency."

Present and Future Development

Since 1919, three subsidiary trusts covering coal, iron, and potash have been organized and are in full operation. A paper trust is being worked out, and the initial organization has been effected by the syndicating of chemicals, textiles, pottery, and some thirty other industries, although they do not exist yet as subsidiary trusts except upon the organization chart in the Ministry of Industry. Foreign trade departments have already been organized for all twenty subsidiary trusts. It may be some years before the subsidiary trusts are completely organized vertically and horizontally and the All-German Trust is functioning fully, as the task is stupendous. So far, however, all the work has proceeded as per schedule with the hearty assistance and co-operation of both employer and employee.

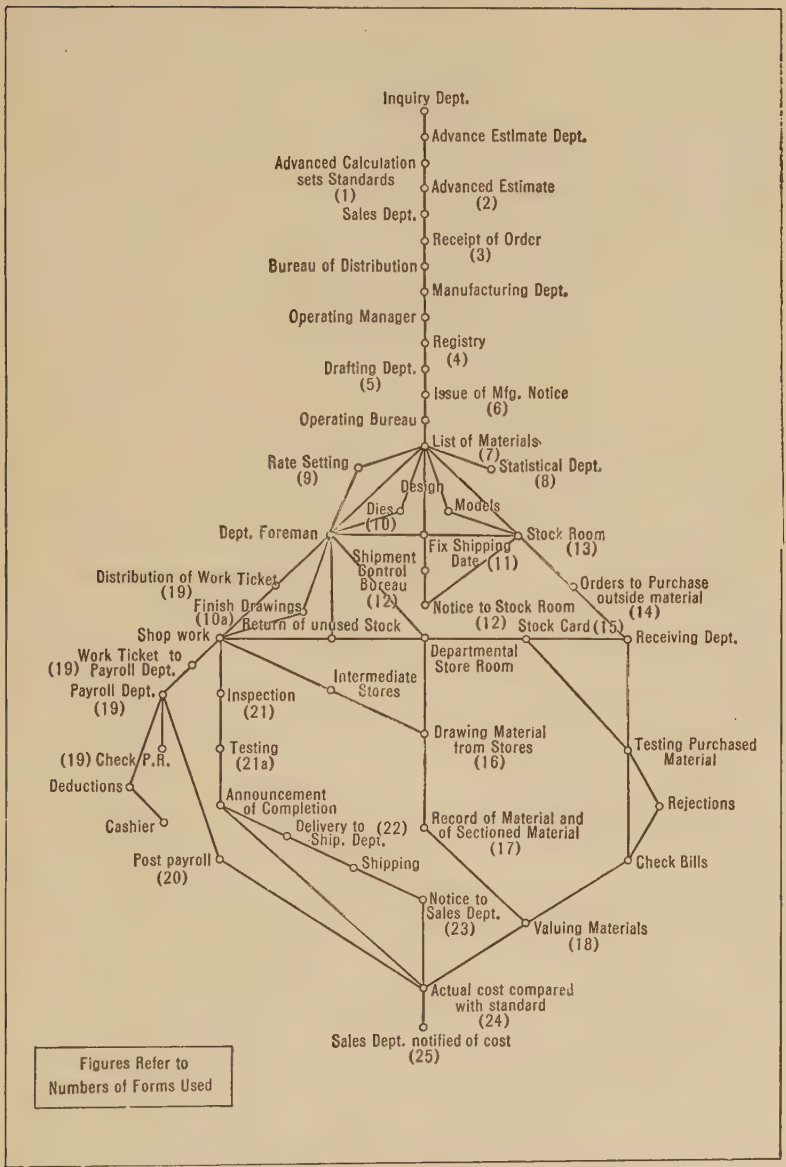

Figure 5. Path of an Order Through the Plant as Scheduled by a German Concern

Germany has always excelled in organization. She has had the will to work, the patience for detail, and the respect for authority that make intricate and smoothly functioning organization possible. In this gigantic All-German Trust she has crystallized the tendencies of the balance of the industrial world for the past decade—the destruction of ruinous competition, the consolidation for efficiency of operation, and workmen's representation in management. With this she has combined the financial, the commercial, the diplomatic, and the governmental elements. As the civilization of today is industrial, the step seems logical.

Private Consolidation in England

England's organization has consisted of consolidation of various interests of a like nature as the result of private enterprise—as in the case of the Vickers and Lever concerns—and, to a less extent, in a development of the vertical trust as such syndicates acquired plants performing operations previous or subsequent to the main business of the company. This has been the result of lessons learned during the war, in many cases by officers of such companies seeing for themselves, as members of government control boards, the advantages of consolidation. One such director of a large steel company told me for an hour of his experiences as head of such a board, and it was quite evident that many industrial Bourbons had learned something and that many lone wolves had been taught co-operation.

Federation of British Industries

In addition there have developed in England great federations of manufacturers—partly as a defense against the confederation of trade unions and partly for such purposes as to control prices and carry on export business. The largest, the Federation of British Industries, was created in 1917 by

the manufacturers of Great Britain "with the object of bringing all manufacturers together in order to deal collectively with all matters affecting industry at home and in order to assist manufacturers in developing markets abroad for the absorption of British products." It is also doing certain standardization work, such as the introduction of uniform cost systems and of fuel conservation methods. "The federation is probably the largest commercial organization in the world formed for the mutual benefit of its individual members and has come to be recognized by the government as the authoritative voice for industry as a whole." It possesses a statistical department, arranges passports and introductions to members traveling abroad, and arranges exhibitions or fairs for the development of new markets and the stimulation of old ones. It is interesting to note that the Federation of British Industries concentrates exclusively on manufacture and trade matters and avoids labor questions, feeling that such a position is more consistent with its position as adviser to the government.

In a recent authoritative outline of the activities of the federation the two following significant statements will be found:

> The first results of the great effort of the United States to capture the foreign markets of the world are beginning to manifest themselves.
>
> No one who knows the industry, application, and capacity for organization of the German manufacturer can believe that it will be long before Germany is again making a serious bid for world trade in spite of overwhelming difficulties at present confronting her. There is also to be considered the rising power of Japan as a commercial and industrial competitor in all markets. The position throughout the whole world at the present time is an artificial one, and should not blind anyone to the facts of the position as they really exist.

National Confederation of Employers' Organizations

In addition to the Federation of British Industries, which, as we have said, follows a policy of aloofness from labor questions, an organization was formed in 1919 to represent the employers in labor disputes as to wages, hours, and the like, known as the National Confederation of Employers' Organizations. This is in liaison with the F. B. I. through a joint committee which meets fortnightly. The N. C. E. O. represents the employers' interests as such and is frankly a fighting organization. Its executive committee is made up of representatives of the following twelve trades: agriculture; building; building materials; clothing trades; engineering, shipbuilding, and metal trades; food; mining and quarries; miscellaneous trades (chemicals, china, drink, gas, electricity, and water, glass, laundries, leather, musical instruments, rubber, tobacco, etc.); paper, printing, and stationery trades; textiles; transport trades; and woodworking and furnishing trades. Subsidiary to this is of course, the multitude of employers' associations which have grown up through years of conflict with organized labor.

Labor Organizations

Opposed to the N. C. E. O. is the Triple Alliance—consisting of the miners, railway men, and transport workers and some dozens of separate unions which are classified into twelve divisions similar to those adopted by the employers. These organizations are formed to protect the workers from exploitation and to secure adequate wages and healthful working conditions for their members rather than to increase the efficiency of national industry. The Whitley committees which have been organized in a number of plants were formed principally to cover such local grievances as can be handled best on the ground rather than by reference back to some ten or fifteen labor union headquarters. Although the

Whitley plan calls for the organization of committees representing classes of industry and British industry as a whole, in addition to the local shop committees, very little has yet been done to carry out such phases of the scheme.

Conciliatory Organizations

The Government Industrial Board, which existed during the war for the purpose of settling disputes between employers and employees, was notified by the employers in June, 1920, that they would no longer abide by its decisions. Neither the masters nor the men were satisfied with its decisions and so it went the way of our own Labor Board. Later in the summer there was a strong agitation against the government employment agencies which seemed about to follow into oblivion those which were created in the United States during the war.

There are a number of leagues, councils, unions, foundations, and the like formed to promote harmony between employer and employee. While they are valuable in teaching each class that the other consists of human beings like themselves and possess considerable educational value which will undoubtedly eventually bear fruit, they are rather debating societies than a part of any great comprehensive plan.

Wage Standardization

Organizations for wage standardization exist in both Germany and England. In England wages are fixed for industry by trade boards and all employers must conform to the standards set under penalty of a fine—not exceeding £20 for each offense. The trade boards are under the direction of the Minister of Labor, who gives notice that wage disputes are coming up for consideration and calls for a written statement of objections to tentative changes as set forth in "Draft Special Orders." The activities of the trade board, however,

cover only a part of the disputes regarding wages and hours which are fought out also by strikes, arbitration, conciliation, sliding scale agreements, and in as many ways as they are settled in America. The tendency is naturally toward a standard minimum wage for industries by districts, as in America—unlimited competition for workmen during a labor shortage having been generally found during the war to result in the workers spending their time in traveling rather than working, with consequent loss of production and increase in cost of manufacture.

The tendency through the industrial world seems to be toward the standardization of wages. In Germany wage agreements have been legalized since the war and cannot be altered by individual contracts between employer and employee. Such agreements govern the various industries as a whole and district rates, covering every class of work, are officially printed for general reference, just as wages adopted in England are published in the *Labour Gazette* of the Ministry of Labour. In America the Department of Labor Statistics *Monthly Labor Review* and in France *L'Information* carry news of current rates, although wage standardization is not as general and as firmly fixed as in Germany and England. So far Germany and England have led in the movement by making wage agreements universal throughout each industry by law with penalties for violation. In America manufacturers are as yet trying to accomplish the same end by moral suasion and coercion in each locality.

Consolidation in France

In France the consolidation of industry has followed much the same lines as in America. There are interlocking directorates and financial institutions, which control groups of industries. There are also institutes and societies similar to our own Steel Institute and various trade associations which

meet to discuss technical matters and conditions affecting the trade. Price-fixing is not generally illegal abroad so that such organizations have officially somewhat more force than those which crouch under the ægis of the Sherman Anti-Trust Law. In France such organizations are usually called "syndicate councils" and are formed under the Law of March, 1884, "for the defense of industrial, commercial, and economic interests." One such, covering shipbuilding, represents 30 companies whose combined capital amounts to over 300,000,000 francs and there are others covering constructors of railway material and the like. The vertical trust and large syndication are the result of private initiative, as in Italy, England, and America.

Consolidation in Italy

In Italy conditions are very similar to those in France. Italy has, however, gone in for associations covering general industries in half a score of provinces equipped with elaborate statistical departments and directed by men of exceptional ability. Consolidation both horizontally and vertically—so far as Italy possessed the raw materials—has taken place very rapidly since the war started. Owing to the fact that some of the banks were under German influence and because Italy had depended upon the Central Empires to a large extent for manufactured goods and for transportation by water, when the war started it became necessary to build from the bottom. In consequence no time was lost clearing away old institutions and the result is in many cases more effective than would have been the case if existing institutions had required change in the face of ultra-conservatism. Modern industrial Italy has all the virility and progressiveness of a western American community unhampered by tradition, because her large industries are the creation of the past few years.

The Hydro-Electric Trust, composed of ten power com-

panies, is a good example of modern Italian organizing ability. This syndicate has certain unique features. All ten companies underwrite the syndicate and are responsible for such obligations as it assumes. Up to 50 per cent of the capital can be subscribed for by aliens, but if any one power company secures control of the syndicate it is automatically forced to sell such control to the other members of the pool. Ten million lire have been subscribed to a general fund to carry on the business of the syndicate and for research work—such as a survey covering the electrification of railways.

Protection of Stockholders

In Italy, by means of certain safeguards, the interests of stockholders of a company are protected by careful government investigation not only at its inception but continually. In the first place all letterheads must show both the authorized and the paid-in capital. The courts must have proof as to these points before the company can operate. The capitalization must be reduced if assets are depleted—by fire, for instance. The company's affairs are controlled by a board of directors and a board of comptrollers, the latter body being responsible to the federal court, and being required to be present at every board meeting and to report irregularities to the court. Comptrollers can have no personal interest in the business. They are usually government officials and trained engineers, public accountants, or lawyers. For the protection of the public, legislation has also been enacted limiting the earnings of corporations to 8 per cent on the investment.

In England the professional company secretary represents and furnishes protection to the stockholder in a manner somewhat similar to that of the Italian comptroller, although to a much less degree and in an unofficial capacity. Professional company secretaries are chartered public accountants and

are thoroughly experienced in corporation procedure. They usually act as secretaries of the board of directors and are present at all board meetings. Inasmuch as they are disinterested financially and are professional men serving a number of companies whose livelihood depends upon their reputation for integrity, it is to their interest to prevent irregularities as well as to advise the directors as to the most advantageous methods to follow in such matters as refinancing and reorganization. In America the corporation lawyer and the certified public accountant furnish the information which in England comes from the professional secretary, but our system fails to protect the small stockholder and encourages the tendency to consult the expert after the damage is done, while the British plan—since it furnishes continuous service amounting almost to supervision—anticipates difficulties and prevents mistakes. Both Italian and British plans aid distinctly in marketing industrial securities; the presence of a disinterested participant at all times tends to insure the security of the capital invested and the investing public is not so much at the mercy of the company officers or of a bank interested principally in securing a good commission for disposing of the securities.

Authority for Signature

In Germany there is a corporation official known as a "Prokurist," who is granted a general power of attorney and whose signature is required upon certain sorts of letters and contracts. His powers are strictly limited but his signature possesses a certain definite authority often lacking in such documents in America. Furthermore it insures important matters being passed upon by one in authority. Under our own loose system one never knows whether to return an important letter for the signature of the president of the corporation, and he, on the other hand, never knows to what

some minor clerk may inadvertently be committing the company under the principal-and-agent or master-and-servant legal clauses. It is unquestionably well worth while to have it definitely understood in every corporation who may sign each sort of letters. While we have no laws that compel recipients of letters to see that such regulations are complied with, serious mistakes can very often be avoided by having it definitely understood within the plant who has authority to sign certain sorts of letters.

Limited Earnings

While in America there has been no general legislation to limit the earnings of corporations, nevertheless there has been a tendency in that direction, as in England in the excess profits penalizations, in the grading of income tax charges, and in fixing the rates which can be charged by public utilities. One large American corporation has set a definite limit on its earnings—of 8 per cent on the invested capital—after which all earnings, after certain reserves are set aside, are paid to the workmen in the form of wages. As a result of this policy the company increased the price of its product only 14 per cent during the war and its cost of production only 10 per cent, even though the cost of materials increased over 50 per cent and the average weekly wage was increased from 14.04 to 32.44 per man. This company maintained a labor turnover of less than 20 per cent, while other similar plants in the same district had turnovers of 300 and 400 per cent, and during the slump in the motor industry at the end of 1920 this company continued in full operation and disposed of its product. One of the unique features of this organization is the education of its employees to a thorough understanding of the principles underlying the business and of its monthly statements. A similar provision occurs in the German Works Council Law of February, 1920, which requires that the heads

of establishments employing 300 workmen must regularly furnish and explain a financial statement to their employees.

Corporate Organization Abroad

The great impersonal corporation exists in each country and in general the English "Limited Company," the French "Société Anonyme," the Italian "Societa Anonima," and the German "Gesellschaft" follow similar lines. For some years the British have distinguished between the administrative and the executive branches of control, the former term being used to designate those devising policies and the latter those who carry them out, much in the same way as in the armies of all countries there exists a staff and a line organization. In the German corporation the board of directors is divided similarly into the Aufsichrat and the Vorstand. In Italy the president of the company is usually some distinguished citizen willing to lend his name to the enterprise, much as titled Englishmen used to serve as company directors. The amount of administrative work done by such men depends, of course, upon their business experience and upon their interest in the business. The Italian "president" heads a distinguished board of directors, who together are known as the "administrative council." The actual conduct of the business—administrative and executive—is in charge of "the direction," which usually consists of one or two men whose powers are similar to those of the American who holds the title of "president and general manager." In some cases the "president" corresponds to our own chairman of the board, although the position is more likely to be filled with a distinguished name than—as is the case with us—by a retired owner or by a chief stockholder who wishes to take up golf and spend his winters in California. In France a great many corporations are family affairs and are run on patriarchal lines, much as some of our New England textile plants are managed, although

the form of organization is similar to our corporate organization.

In England the directors are commonly in actual charge of various departments of the business. One will have charge of manufacturing, another of sales, another of finance and accounting, etc. These men are almost always heavy stockholders—very often through inheritance—and seem to work together in amity with about equal authority—each one attending to his own affairs. In England the gap between a director and a man who comes up from the ranks is much greater and much more difficult to bridge than that between one of our own assistant heads of departments and his chief. In fact there is usually an atmosphere of the Holy of Holies about the directors' room in an English plant—as to those who occupy it—because it is really used for something besides show and a perfunctory monthly meeting—as to the daily luncheon that is served there—and as to the momentous decisions which are reached therein. To an outsider it is principally noteworthy for its clubby atmosphere, for the charming hospitality of those who occupy it for an hour or so at midday, and for its invariably excellent Scotch.

To some extent English directors are similar to our own working vice-presidents. Their positions are somewhat better defined, however, and there is less difference in rank between them and the managing director than between our vice-presidents and the president of the company. Our president is an autocrat, is surrounded by his own staff, and calls upon his vice-presidents for information or to receive instructions. The English board is more of a partnership affair—much more easy-going and democratic with the democracy of the true aristocrat. Their positions are assured and fixed, which largely eliminates industrial politics and makes for self-confidence and conservatism.

In the largest companies in England the managing director

is more like our own president and general manager, supported by sales managers, work managers, and financial managers appointed by him from the best available material. This makes for progress and the high type of personal efficiency which develops only under the spur of competition. Our system puts almost unlimited power in the hands of our company presidents but it is a very good one for getting things done. In the case of the larger British consolidations, directors from each organization serve on the general board. This corresponds in a measure to the arrangement in certain large American syndicates where the president of one of the larger units serves as president of the whole and the other presidents constitute the general board of directors. However, the form of organization is not important provided it furnishes a proper stimulus to effective effort. That and the ability—administrative and executive—of the men responsible for the conduct of the undertaking are what determine its success.

Increased Desire for Facts

A particularly interesting development of the war has been the general realization of a need for facts upon which to base industrial administrative policy. When in June, 1920, the International Chamber of Commerce was founded in Paris the commercial organizations of America, England, France, Belgium, and Italy were consolidated for the purpose of securing and exchanging facts—in regard to supplies of raw materials and of manufactured goods, in regard to shipping and docking facilities, and in regard to industrial and commercial conditions generally. Furthermore, the development of governmental foreign trade departments has been much stimulated, partly because of the entire change in the economic and political balance of Europe and partly because the citizens of the world during the war discovered the value of pooled authoritative information.

There has been a similar increase in the desire for technical information. We have already mentioned the part played by research in the German economic plan. Similar work is being conducted by the great syndicates, such as that of the iron industry, which supports an "Institute for the Scientific Research of Iron." In America we, of course, have the Rockefeller and Carnegie foundations, the Mellon Institute, and numerous university laboratories doing research work of various sorts; as well as the laboratories supported by associations of manufacturers and by the government—those, for instance, at the Arsenal in Pittsburgh and under the direction of the Bureau of Standards at Washington. In England there has also been a movement to make the factory control of the product a function of the research laboratory.

Commercial Exhibitions

Another development which may have a large influence on sales organization is the recent increase in the number of commercial exhibitions and fairs. The British government is sending such touring exhibitions to its dominions, to South America, the United States, India, and the Far East. The French fair at Lyons and fairs at various other European commercial centers have been in existence for a very long time, but it is only recently that the Bush Building in New York furnished Americans an opportunity to buy generally under one roof. The style shows, such as that held annually in the Forest Park open-air theater at St. Louis, are another development along this line. In England a building similar to the Bush Building is being erected at Aldwych near the Strand. On the whole it almost looks as if the world were beginning to realize the terrific waste of shipping thousands of high-priced salesmen across the continent in pullmans to spend a large part of their time waiting in anterooms, in expensive hotels, and in railroad stations.

A New Civilization

To the man who visited Europe before the war and returned with an impression of stuffy little concerns, jealously guarded from visitors and operated under inherited traditions of extreme antiquity, the change is incredible. Education is always expensive but it would be strange if from so cataclysmic an experience as five years of world war the lessons learned were not correspondingly great. For some fifteen thousand years—until the dawn of the Steam Age in the eighteenth century—the progress in the life of mankind, physical and mental, consisted of refinements of what already existed. It has been given to us to witness the formation of a new civilization. The transition from manual labor, sailing ships, and animal transportation to machinery, internal combustion engines, and electrical communication has substituted city dwelling for the century-old life in the open and has made physical exercise unnecessary to existence. So complete a change in the manner of living has tried to the utmost an organism created for a certain environment through ages of evolution. Each clan and each district has reacted to the stimulus in a different manner. Each factory has developed its own tradition, with principles, methods, and morals as different as those which existed under each robber baron in the feudal castles which dotted the plains of Europe in medieval times. Each petty tyrant has guarded his holdings jealously and his vassals have fared well or ill in proportion as nature created him wise, predatory, or merely a weak inheritor of what abler men had created.

Under such intense individualism and comparative isolation progress was necessarily slow. Each manufacturer devised his own methods. If fortune favored him he taught his little tricks to his son as business secrets of incalculable value. When the eddies of civilization carried his trade elsewhere he ceased to exist or his fief was acquired by an abler lord.

As time went on certain business principles were developed—a piece here and a fragment there. But there was no general pooling of knowledge. Men of deep insight and broad knowledge were too busy to teach others. Fools are seldom grateful for gratuitous advice and it is easier to let them fry in their own fat. Meantime waste and the cruelty of ignorance were rife in the land.

Then came the war—not a war of muscle and sturdy blows but a war of machines. Whole peoples went forth to fight. Every ounce of strength of every woman, almost of every child, multiplied a hundred fold by the use of machinery, was needed at home to furnish materials for the two double lines of men who faced each other across the civilized world—from the Baltic to the Red Sea and from the North Sea to the Adriatic. It was not a time for conservatism. Trade secrets went by the board. In England, in France, in Italy, in Russia, and in America the best that industrial minds had learned in a century of the new era was poured into the lap of the sore-tried Entente in its struggle against the organization, the materials, and the inventions that the Central Empires had piled up during half a century. Waste became a crime. Standard methods were devised and enforced. The most able men headed the government war boards and became teachers to industry at large—teachers whose pupils heeded their precepts or who disappeared from the control of what they owned. So it went on for nearly five agonizing years.

The lessons of organization learned by the world's captains of industry are now going into effect. Wasteful competition is giving place to consolidation. Knowledge is being pooled. Industry has been recognized as an affair of the people to be administered in the interest of the public good. We have recognized ourselves as an industrial world bound together by common interests.

CHAPTER IV

EUROPEAN AND AMERICAN LABOR

Labor and Human Nature

Labor is human nature. This is sometimes hard to remember while professional uplifters sob forth its wrongs and when bitter old men advocate hanging its leaders to lamp-posts. As a matter of fact neither one is right—as anyone who has carried a dinner bucket and experienced real manual labor knows. Labor is just the raw material. Most of it remains raw material, but some of it—owing to its environment and the virtues of its ancestors—gets worked up into millionaires, preachers, engineers, and professors. It is not as highly polished—either internally or externally as the finished product, but fundamentally it is the same. It has a nose, two eyes, and two legs and it averages quite as selfish and quite as big a grafter—if it gets the chance—as the highly manicured and silk-hatted finished product which rides to work in a limousine. It is not necessarily unwashed because it wears a flannel shirt and it is quite as smart in its own province and quite as interesting to talk to as its brother with more clothes and more money. When it gets very angry it forms a howling mob—but that is just because there is so much of it and it is so raw and elemental. What it accomplishes is not very different from what the finished product does when it gets equally angry, except that there is less finish about the method.

The fundamental difference between European labor and American labor is that abroad labor expects to have to remain in the class in which it was born, and makes arrangements accordingly, while in America we all hope eventually to become millionaires and are not so much interested in changing the

organization of society. Here we feel much the same as does the casual sojourner in a city—he doesn't care if the pavements are bad and if the police force are grafters—he expects to move on. But when you've got to live in a town—and drive the family flivver over those holes in the road four times a day and your sons are invading the dance halls—then you start in to take an interest in politics.

A Proletariat Class in Europe

This is due partly, of course, to our greater natural resources and Europe's overpopulation which makes it easier to rise in the social scale in America. But it is also due to the greater physical and mental contrast abroad between the ruling classes and the proletariat than between the leaders and the followers here. We must remember that the members of the European lower classes who come to America represent the flower of their class—the ambitious, the courageous, and the adaptable. In France the lower middle class regard the peasants as almost of a different race. In Italy I was told that a peasant woman was as impossible a house servant as the proverbial bull in a china shop. I have talked to English farm laborers whose mental processes were not much more alert than those of the cattle which they tended and certain bucolic Germans are as woodenheaded as the toys they carve in the winter.

Furthermore, in Europe, those on top have been looking down and those below have been looking up for a very long time. The lower classes "know their place." They have not been taught that one man is as good as another. Even the dress of the various classes differs. An Englishman complained to me that in America he could tell neither a man's class nor his profession by his clothes. Here, in the matter of dress, Fifth Avenue is the standard for all of us. Abroad even the features and the physique of the classes differ. A

friend of mine endeavored to introduce scientific management into a British factory. Immediately London was wired for union officials. That night in the labor hall their climactic exhortation was—"The chest of the British laboring man averages twenty-nine inches. The chest of the British factory-owner averages thirty-nine inches. Are you men going to stand for any system that takes more inches off of your chest and puts it on to his?" And then amid overwhelming and vociferous cries of "No!" "Never!!" and "We'll die first. Britons never shall be slaves!" scientific management was hurled into oblivion.

Those of us who saw the Liverpool, the Manchester, and the Glasgow workmen entraining for the training camps in August, 1914, will never forget the ill-shapen bodies, the bad teeth, and the horrible complexions of those men. In 1920 I was told that one reason for the food shortage in Italy was because the Italian had learned to eat a square meal in the army during the war. I have never seen such murderous looking children as the boys of fourteen and less who work in the steel plants of England, where, until the passage of certain much needed child labor laws,[1] the motto was "catch 'em young and treat 'em rough."

Lack of Opportunity Abroad

A man who loses his income abroad is finished. He knows that it is almost impossible for him to get a fresh start. Holding to that which is yours is almost an element of survival—and that makes for a hardness which seems cruel to the free-handed generosity of a more fruitful land. People poverty-stricken until they worry about the propinquity of the point at which the fittest cease to survive, do not feel that they can afford to indulge in the grand gesture and the

[1]Education Acts of 1918 abolished full-time employment of children under fourteen and made compulsory the attendance of young persons under sixteen at continuation schools for 320 hours a year.

generous impulse of grand seigniors whose estates adjoin—or of the more fortunate born to equal opportunity in a country where poverty is an incident and not a fate. We have no right, therefore, to criticize lower class Europeans because they are grasping or for dreaming dreams which seem preposterous in America. After all is said and done the most obvious solution is that offered by a certain gentleman with a long upper lip who, after giving the matter some hours of consideration, burst forth with, "An' shure the only way for a laborin' man to succeed in Oirland is to go to Ameriky."

Economic Evolution

Furthermore the background is different. Since 1620, even until today, the American who has felt that the community is holding him under has had only to move a little further on, into the sparsely settled lands, to become the master. We have had three hundred years of that and the training tells. In Europe slavery began before recorded history. Slavery to individuals was followed by vassalage to feudal lords. Even yet "economic slavery" is a term which describes what is a bitter reality abroad as compared with America. Their only way out—except for emigration—is economic evolution, and that is what European labor means to have now.

It was very nice for the upper classes to be able to bestow a lira, a franc, or a shilling without missing it, and to have it mean so much to the recipient that he would fairly grovel with gratitude. Most of that disappeared during the war. The rise in prices cut the power of the rentier class and the rise in wages and the shortage of labor increased the power of the laboring class, and there was a marked decrease in groveling. With the pressure somewhat relieved and with labor not educated to the difference between the use and the

abuse of power, some bad mistakes have been made. The first taste of liberty often results in overindulgence—whereupon it becomes license and the after-effect is bitter experience and either the attainment of wisdom, or failure to learn and final extermination.

Result in Russia

America has been horrified with some of the excesses committed in the name of liberty. But we must remember that an abused dog is an abnormal dog and that past beatings are almost always responsible for his attempts to bite the hand that would at last administer either food or encouragement. And there have been some long, long scores to settle. While the people have been learning that overindulgence means pain and in consequence learning self-restraint, their leaders have been learning their own bitter lessons. A diplomat who went through the Russian Revolution told me that the most conscience-stricken men in Europe were the Russian *intelligentia* who played a part in the Muscovite upheaval similar to that played by the Rousseau School in the French Revolution and that which our own parlor Bolshevists desire to emulate in America. They convinced the mob. Once the killings began these *intelligentia* went around wringing their hands in agony crying, "This is awful! When we told the proletariat the aristocracy was responsible for this trouble and must be crushed we had no idea he would take us literally! We didn't realize how elemental he was! This is terrible!" But it was a bit late for remorse. The organizing brains of Russia had been scattered upon the pavements of Petrograd and Moscow or had fled the country. Now the Russian must struggle up from the depths unguided, a prey to adventurers, paying with blood and sweat for his ignorance and for the impractical and impossible dreams of well-meaning irresponsibles.

Conditions in Italy

The lesson has been a bitter one but it is not without its value to the rest of us. While I was in Italy a delegation of Italian Bolshevists returned from Russia. Their Italian comrades had awaited their arrival eagerly for news of the millennium "now that the real truth was for once allowed to emerge from Russia." They were silent for nearly three weeks and then the Red press stated that—"while it was true that the proletariat was doing little, if any, work in Russia it was all the fault of the former capitalistic class who had not taught them to work!" The news cheered my traveling companions greatly, who felt that now that the faults of human nature were being ascribed to capital, the *reductio ad absurdum* was not far distant.

It came in Italy in August. While I was there in July the pink stucco walls in the industrial villages, in Ferrara and in Milan, were everywhere decorated with that double V—which, when right side up means "Long live" and when upside down means "Down with"—followed by various words which translate into "Long live the Republic of the Soviet!" "Long live the Revolution!" "Long live Trotski!" "Long live Lenine!" "Down with War!" "Soldiers be with us for the Social Revolution." One scribbler even had time for a *"Viva Fiume Italiano!"* The province of Ferrara was then supposed to be in a state of insurrection, although a few *bersaglieri* in steel helmets mounted on motor bikes were the only visible signs of any disturbance and this meant little as soldiers are likely to be encountered almost anywhere in Europe. In going through the factories the shop spirit of the workers seemed good. No black looks were directed toward our conductors and everyone seemed peaceful and contented. But they weren't working very hard. In the largest plant we visited we were told there had been only one strike since the sixty-day strike of the previous August. This had lasted

three days, one day of which the strikers devoted to banking the fires and preparing for the shutdown on their own time. We were even told that the output per man was greater than before the war in spite of the change from a nine- to an eight-hour day—owing to the introduction of improved machines and modern methods. The general street-car strike had been going on nearly a month—but there was considerable politics mixed up with that—and Venice had gone back a century or two through the disappearance of the usual ubiquitous motor launches whose operators were on strike. The socialists in the motor-car industry in Turin in March had demanded that workmen's committees be instructed in methods of management—with the idea of taking charge later. The works were shut down and a month later the workmen capitulated.

Political Situation in Italy

But the political situation had a distinct bearing on the case. One of the largest and most progressive manufacturers in Italy informed me that in his plants about 10 per cent of his workmen were anarchists[2] but that the percentage would run higher in some other plants. A little later one of the best informed men I encountered in Europe told me that Italian workmen split into three divisions—the Catholic unions, composed mostly of conservatives to some extent influenced by the priests—the socialist unions, made up of atheistic men most of whose wives remained Catholics—and the conservatives, who were not unionized. He estimated that 30 per cent of the workmen belonged to the first division, 30 per cent to the second, and 40 per cent to the last. These unions merge into the political parties in a way not usual in England or America. The Liberal Party in power in 1920—by about a three-fifths majority—was composed of about 55 per cent socialists, half of whom were for gradual peaceful

[2]See definitions of various sorts of radicals in Appendix A.

revolution and half of whom demanded the Soviet at once. The Popular Party, which consisted of the Catholic unions and their sympathizers and had just appeared as a political party, represented about 35 per cent of the party in power. The Republican Party (5 per cent) wanted a political republic like America and the Reformed Socialist Party (5 per cent) had a particular brand of conservative socialism similar to the radical socialists in France. Plant superintendents and others who were in a more or less neutral position between employer and employee told me in July that they felt the trouble had just about reached a climax. They had faith in the basic common sense of the workmen but they stated that a lot of older manufacturers were pretty reactionary and despotic—which might lead to trouble. Altogether it seemed as if the stage were pretty well set for a flare-up of some sort in the near future. The explosion occurred in August.

Industrial Uprising

After a period of passive strikes—"No Overtime," "Ca' Canny," or systematic soldiering, "Work to Rule" (a type somewhat serious in Italy where the great number of sanitary and workers' protection laws are too perfect to permit at the same time complete enforcement and the performance of anything like a day's work)—output in the metal trades was decreased, first 30 and then 50 per cent. Then the great Romaio foundry of Milan suddenly decreed a lockout. When the men came to work they found the plant occupied by *gendarmes* with machine guns. That night there was a general conference of employers and employees before the Prefect. The employers had agreed upon a general lockout and felt they held the trump card. As the debate waxed strong messenger after messenger hurried in with telegrams which the Prefect read to himself with an impassive face. At last the employers decided to deliver their ultimatum. As their spokes-

man rose the Prefect held up his hand—"It seems that we are playing at cross-purposes, gentlemen," he said calmly. "The workmen have this evening seized all the factories in the district." This was the first news the employers had received of the steps taken by the Committee of Action which had that night occupied by force over 300 factories. Within a few days the number swelled to over 2,000, well fortified with barbed wire and machine guns.

The employers called for troops and gendarmes. The government, which, as we have seen, was 55 per cent socialistic, which counted upon the unpopularity of profiteers, and which needed the taxes which they felt a sight of the company books would give them, refused to interfere. The men slept in the plants and in some cases output rose 20 to 30 per cent. Discipline was strict. In some cases men were actually discharged. Raw materials were seized in transit and at the mines. A general sales bureau was created in Milan.

But it is sometimes easier to steal an automobile than to run it. Difficulties were developing. Although in some cases the technical staff had remained at the plant, it was discovered that there was a thing called "management." The workmen found they had to meet problems of policy and administration which they were incapable of solving—that they had taken over a great commercial machine which they could not operate. In cases where the goods could be sold it was found that instead of the immense profits which the men expected there was a deficit—that there was not even enough to pay the old wages—that operated without skilled management the properties were insolvent. They found that workmen were not equipped to do what the capitalist could do. They began to realize that there is a *raison d'être* for the capitalist—the skilled administrator—that he is an asset to the community and that he is quite as worthy of wages as the man who sweats over a machine for a living. People were afraid to buy the

output of the seized factories, doubting the legality of such sales. Producers were afraid to sell the factories raw materials —for fear they could not collect what was due them. It became evident that it was time to climb down.

Defeat of Bolshevism

On the 10th of September a great meeting of the General Trade Union Council was held in Milan to decide what should be done—whether all industries should be seized or whether they should proceed to negotiate. The vote was 6 to 4 in favor of negotiation, which meant the defeat of Bolshevism in Italy. On the 15th representatives met with Premier Giolitti in Rome. As a result the famous "Decreto" was published, in which the right of workers to participate in the financial and economic affairs of all factories of Italy and the creation of factory councils on these lines was decreed and a committee appointed to work out practical ways and means. The factories were then returned to the owners amid great general rejoicing. The men secured a raise of 4 lire a day but no back pay for the strike period, were conceded an annual week's holiday with pay, and went back to work with the *mot d'ordre*—in the words of *Avanti,* the radical paper—of "Produce cheap and much—afterwards we shall see."

Steps in Development of Bolshevism

I have given a detailed account of the adventure in Italy because it is indicative of the trend throughout the industrial world and because the experiment was closely watched by capital and labor. It represents the logical course of events where a well-informed, educated, and sensible people are attacked by the virus of Bolshevism while weakened by war and by the presence of Bourbonism in the administrative class. A less intelligent democracy would have plunged Italy into disaster more terrible than that which has overtaken Russia,

because a large proportion of the people in Italy are dependent upon the successful administration of industry. The steps in the disease as it attacks an industrial nation may be enumerated as follows:

1. Overconfidence of the manual worker, due to the demand for his services during the war.
2. Desire for the millennium—inherent in most members of the human race. Belief on the part of the ignorant that such a millennium has been established in Russia by the use of a certain Soviet system and that the same millennium can be reproduced elsewhere by the same methods.
3. Unrest, due to the return from war to work and the general industrial reorganization occasioned by a change of the world from a war to a peace basis.
4. Agitation upon the part of well-meaning but inexperienced idealists and by the "have nots" who hope to join the ranks of the "haves" by the overturn of the existing apple cart.
5. Autocratic assertion of power on the part of industrial Bourbons, who believe that pre-war conditions can be forced by rough treatment and that war profits must be maintained.
6. Revolt of the conservative workmen under this treatment.
7. An experiment with the Soviet form of industrial control.
8. Discovery of the value of management and the exposure of certain socialistic fallacies.
9. A healthy lesson for the Bourbons and for the radicals —each discovering that it doesn't pay to carry things too far—and that co-operation is necessary to success.

10. Concessions on both sides.
11. Recognition of the fact that industry is a mutual interest and that the owners and the workers each have the right to a voice in its administration as well as a responsibility for its successful, efficient conduct.

Outbreak in Germany

In Germany there was a radical demonstration in the spring of 1920. In the late autumn—just as certain employers had predicted when I talked with them in Berlin—there was another outbreak and the workmen, following the Italian lead, attempted to seize the factories. But all summer the organizing brains of Germany had been at work. The Shop Councils—the Betriebsrat—had been perfected. Workmen already had a voice in the administration of industry. "Why should they join the radicals?" argued the conservatives. So the radicals who attempted to emulate the Italian metal-workers were thrown into the street by the very efficient Berlin police and work went on as before. We have already discussed labor's part in the organization of the All-German Trust and we shall have more to say in the chapter on shop-government plans. In the case of the latter the emphasis placed upon the right of participation in management, carrying with it responsibility for operating efficiency, is especially significant.

I witnessed only one strike in Berlin and this was due to a misunderstanding as to the interpretation of a rule. The staff took it as a matter of course, the mob gathered around the director's office was orderly and took the affair phlegmatically, except for a few ancient dames of considerable physical magnitude who sat on the steps and wept copiously. The strike was all over in three hours and the shop spirit was excellent the next day. In the consideration of all industrial matters, due allowance must be made for the inherent love of order characteristic of the German nation.

The practical result of the revolution was the increase in influence of the laboring classes in the state and economic life of the country. The despotic militarist who would "drive the workers to their knees and keep them there," still exists—I met several of his kind in Berlin—but as the masses learn the difference between liberty and license—a distinction which the Germans have assimilated with a smoothness and a speed not elsewhere paralleled in history—there should be less occasion for this type of tyrant. Labor seems to be playing its part in the development of Germany's big idea—the Organized Economic System. If the German laboring classes continue to co-operate and the plan is successful, the rest of the world, unless it does likewise, will have about as much chance of meeting competition as has the one lone grocer or tobacconist next to whom the branch of a country-wide chain-store opens.

Demonstration in France

In France the outbreak occurred in May, 1920, when processions of Reds paraded and demanded that the workmen who remained in the plants should join them. The French cavalry dispersed the paraders and the nationalization of industry and the one big union idea went into the discard. Trade unions are not recognized by the government in France. At the time of the railroad strike in the spring of 1920 an attempt was made at a general strike—partly as a political challenge. The leaders were arrested and meetings were prevented and legal steps have since been taken to inflict heavy penalties for public service strikes. The dissolution of the General Federation of Labor was ordered on January 13, 1921, when Leon Jouhaux, president of the federation, and certain other officers were fined for infringement of the law governing unions. There are practically no closed shops, although most plants have some union members. At one of the larger plants I was told that about a third of their workmen were Syndical-

ists and that a couple of hundred of them had indulged in an unsuccessful strike a short time previously. There are no grievance committees and the nearest thing to participation in management I could discover was in one of the most progressive plants, where delegates from each shop have a talk with the head of their department once a month.

The eight-hour day has, however, been decreed by law with the same pay for eight hours as was formerly received for ten. In some cases the production per hour has increased as a result. On account of the man shortage in France there is, however, a good deal of overtime. Considerable Chinese labor brought in during the war still remains. France is also using Russian war prisoners who do not want to go home, Algerians, and some Spaniards.

General Situation in France

On the whole, the situation in France is peculiar. It is very easy to dismiss the lack of unions, of machinery for negotiation, and of workmen's representation schemes as an evidence of industrial backwardness and of the survival of feudalism. One government official in Italy stated that France was really a monarchy masquerading as a republic. The European representative of one of our largest industries told me big business "had everything absolutely sewed up" in France and cited the destruction by weather of thousands of American war automobiles withheld from sale through the influence of French manufacturers who did not want their market ruined. Those who inveigh against paternalism—welfare work under the direction of the employer—can find plenty of examples in France. But such snap judgments are misleading.

We must remember that France was the mother of modern democracy—that what she gave birth to in the eighteenth century and what America adopted then required most of the next century to be worked out in Italy and England in the form of

the limited monarchy and that it did not reach Germany and Eastern Europe until almost a quarter of the twentieth century had elapsed. We must remember that France is an exceedingly well-educated nation and an exceedingly logical nation; that doctrines which have swept over loose-thinking and sentimental peoples, only to be found harmful in the end, have—punctured by her cold and remorseless close thinking—passed her by untouched. Furthermore she is not an industrial nation as America, England, and Germany are industrial nations. A much smaller proportion of her population is engaged in manufacture. We must remember also the camaraderie between the French poilu and the French officer—the *mes enfants and mon garçon*—the real democracy that existed without loss of discipline, the service in the ranks of all classes before, during, and since the war. Most of all we must remember that spirit, heart, and character, of master and of man is what makes for understanding and co-operations—not system and organization. Personally I wish to say this—I never saw better shop spirit, better understanding and heartier co-operation than very evidently exists between the workmen and the executives with whom I traversed some miles of French factories. Paternalism may be a crime, but it is a question whether the wise industrial fathers of France and their understanding sons are not preferable to the sort of freedom that exists where an ignorant mob—unlearned as to where liberty ends and license begins—rushes hither and thither at the call of the 51 per cent. In any event, French history is pervaded with sufficient horrible examples of what happens to despots who cease to be benevolent to deter the type of parent who exploits his children to their harm.

Labor Situation in England

The labor situation in England presents most of the British virtues and all of the faults. British character seems to

enable them to muddle through somehow under what would be hopeless conditions in any other country. The whole thing is as full of paradoxes as Gilbert and Sullivan. In the first place the country has got to produce cheaply to exist, as two-thirds of its foodstuffs must be paid for with profits from manufactured articles sold in competition with other countries. Are labor and capital co-operating to that end? They are not! Labor is loafing on the job from one end of England to the other just as it did before the war—holding tight to the rule of one machinist to one automatic machine, in spite of the fact that one woman operated four during the war and one man often operates six in America. Are they going in for multiple drills which bore forty or fifty holes at one time? They are not! The most multiple drill I could find anywhere at the Olympia Exhibition could drill only two holes at a time.

Labor is organized to the *n*th degree and is doing everything possible to hurt the employers. Are the employers sore? They are not! They regard the fight as a sporting proposition and applaud heartily every time their opponent gets in a skilful body blow. Red radicals preach in every industrial center. Do they lock them up? Certainly not. They talk about personal liberty. Industrial England is the most drink-sodden country in Europe and yet the howl that goes up when moderation is mentioned makes you feel as if you were filching milk from a child. All that "Father, dear father, come home with me now" poetry and "Drunken Husband Knocks Wife's Teeth Down Her Throat" head-line stuff that never happens in France, Italy, or Germany and which died out in America twenty-five years ago, is still going on in England. The *intelligentia* plan the details of the revolution and instruct the working man how to act, and about the time you expect to see a crimson sky over Berkely Square and the city in flames, they explain that what they are describing will probably happen eventually—say, in a hundred years or so.

If you don't allow for the fact that the British—both capital and labor—possess an immense amount of common sense, character, and mutual respect, you are likely to be badly deceived. What would be vitriol to another disposition is merely a pleasing and stimulating condiment to the palate of the phlegmatic Britisher. But whenever he tells you how clever you are or how violent or how stupid he is, watch what he does—not what he says. If you forget that you will find yourself where the Germans did when they expected a revolution in England to help them in 1914. The British are essentially sound—whatever the surface indications.

Views of Representative Englishmen

A series of personal talks which I had with certain labor leaders, with men at the heads of large industries, government officials at the Ministry of Labour and elsewhere, educators, and the like, late in 1920 will perhaps show the situation as it exists in England better than anything else. The men were thoroughly representative so that the lack of agreement is significant. The names of the men are withheld for obvious reasons.

An Economist

A celebrated economist—a man of title and a practical student of industrial conditions in England and in America said he felt there might be a reconstruction of the capitalistic system within twenty-five years. He did not anticipate bloodshed or an immediate revolution of any sort. He stated that the people talking revolution were the reactionary owners of medium-sized plants who had banded together in certain associations and had preached "drive the workmen to their knees" until they had been called off by the more broad-minded and far-seeing manufacturers. He felt that the responsible heads of the great unions did not want strikes, knowing just what suf-

fering such fights entail. He dwelt upon the long experience of British labor union leaders and the fact that most manufacturers preferred having such men to deal with when there was trouble with their workmen.

He stated that inasmuch as England must import more than half her foodstuffs, it naturally followed that she must pay for such food with manufactured goods. The only way she could sell such manufactured goods was to meet the prices of foreign competitors. The only way she could meet such competitive prices was to reduce the cost of manufacture by increased production. Limited output, however, was prevalent and was due to the cutting of piece rates in the past and to the belief among working men in the "only so much work to be done" theory. Under the circumstances the necessity for increased production would quite probably have to be demonstrated by bitter experience—by loss of jobs forced by the shutting down of factories which had lost orders to foreign competitors.

An Editor

The editor of a technical magazine, thoroughly in touch with industrial conditions, told me England produced about a third of what she consumed and that they must meet foreign competition to secure the other two-thirds. He stated labor was convinced that high individual production resulted in shutdowns and had for the most part gone back to one automatic per operator and to limiting production as much as possible in every way. Piece work—known in England as "payment by results"—is generally opposed by the labor unions. In his opinion there had been too much trading between manufacturers and workmen, compromise of disputes usually taking place on a 50-50 basis regardless of whether the raise in wages was justified or not. This had been the easiest way for the manufacturer, who, during and since the war, had been

able to pass the increased production cost on to the consumer. As a result of this abuse, the consumer had stopped buying, employment was increasing, and many expected some sort of a revolution. He continued:

> Recently a concerted effort on the part of manufacturers has been made, to get in closer personal touch with their workmen. Executive offices of several large concerns have been moved from London to the cities in which the plants are located.
>
> The workmen are now demanding all of the raise asked for as a moral right instead of being satisfied with the 50-50 compromise. Unfortunately the men have become so in the habit of securing every raise asked for and the employers so in the habit of climbing down that the latter have lost their nerve. The longer the fight is deferred the harder it will be for the employers to win it. The men are fairly well educated and the majority possess considerable common sense. The only question is whether some will not lose their heads when the fight begins.

A University Professor

A university professor, head of a department in one of the large technical colleges and a man of considerable industrial experience, told me he did not expect a revolution. However, he believed that the people have been so exploited for years that they are very suspicious.

> All believe in limiting production but they must get out of it. The workmen are intelligent but unbelievably ignorant—and they are beginning to find that out. To bring the workmen, managers, technical staffs, etc., together and to educate them mutually, an industrial council has been formed in Manchester. Lectures are well attended and intelligently discussed from the various standpoints, which is mutually helpful. A lecture recently on finance caused considerable restlessness among the workmen present. The speaker was at a loss to account for this until afterward when he was approached by a number of the men and asked to assist them

in arranging for a course of instruction in finance at the local night school. They didn't know the meaning of such terms as "bond issue" and "reserves for depreciation" and they purposed to find out.

The workmen suspect all that originates with the employer, their stock phrase being "Wot's the bloody gyme now?" whenever any new proposal—whether welfare or otherwise is made. Workmen's meetings have been largely in the hands of the noisy and socialistic elements. But the time for the real British workingman to assert himself is at hand and he can usually be depended upon for common sense and concerted action.

A Government Official

An official in the Ministry of Labour—a man long noted for his humanitarian viewpoint—said:

I do not expect any great upheaval, although in times of stress it is hard to tell what may kindle trouble or where the conflagration may end. Trade associations have kept prices up—employers still want 25 per cent profit. Workmen have not been getting their share and prices are still mounting.

A peculiar result of this has been that a lot of little businesses have sprung up like mushrooms—concerns where a father and a couple of sons perhaps have started a factory in their own home. They can work twenty hours a day if they want to. There is no government or trade union regulation. They haven't the overhead charges of the big business and people have taken to buying door latches and mouse traps at such places instead of at the ironmonger's.

I have faith in the British workman, although there is some strong radicalism—the result of past exploitation and the cutting of piece rates. Limited production is as much the employer's fault as the workman's.

Trade union leaders do not want a big strike now. They know just what it means and the misery it would entail. A good deal of the radical talk you hear and read in the newspapers must be regarded as the blowing off of steam. We encourage them to talk, over here, but handle them drastically

if they begin to do anything. I think you are more inclined to lock them up as soon as they begin to talk. We would regard that as an interference with the rights of free speech in England. In fact, a lot of our people over here consider America is still in the feudal stage in its treatment of labor. We'd have a revolution right away if we tried to handle our labor disturbances the way you do.

Another man—considered one of the brightest minds in England, who is working heart and soul for the working man and who has had wide industrial experience—epitomized the labor situation as follows:

After the war, with munition plants shutting down, demobilization in full swing, and the whole industrial situation in a state of flux, there was rightful unrest. The government was alarmed and in February, 1919, appointed a commission to deal with labor difficulties. An industrial conference was called and held off the crisis for six months, by the end of which things had settled down sufficiently so that the government was no longer frightened. It therefore refused to carry out the recommendations of the commission. Labor's reply was the railway strike of September, 1919. Both sides were so well organized that they both got cold feet and compromised. The experience of the past few years has made the worker less willing to strike. He has been better paid and fed and unemployment has practically ceased to exist. The unemployment attendant upon present conditions may make people savage.

Ca' canny is undoubtedly going on. The average man does not see why he should work. There was a big campaign for increased production in 1919. Prices went up when the people had been promised they would go down. This looks as if it proved the workman's theory of limited production. Even if prices do drop there is the question as to how much the markets which the rate of exchange and our relations with the East will allow us to reach will absorb. In the present uncertainty the manufacturers prefer to hang on to their existing policy. Meantime it is America's opportunity.

The people are not revolutionary but fed up—with nearly everything. It is impossible to say what they will do eventu-

ally. Probably for the present they will drift on. I am sure that no definite revolutionary aims exist in the minds of the majority of British citizens.

A Labor Leader

A journey into labor strongholds brought out a slightly different viewpoint which the two following interviews will illustrate:

I do not expect a revolution. I believe the trend is toward participation in management—probably through government ownership. For instance there would be a Minister of Mines in charge of the industry—perhaps a man of the type of Lord Rhondda, who has had practical experience in mine management. The safeguard against the usual inefficiency claimed for government ownership would lie in the responsibility of this minister for the conduct of his industry. He would have to so run his department that he could defend his policies and prevent his party being turned out of office.

Socialistic experiments of the past have consisted of isolated communities, so that these have proved no criterion. The British workingman has been somewhat horrified at the driving of workmen into Russian factories, of course, and it tends to make others pause. However, conditions of education differ here. The Labour Party is now in a position to back its own policies—we are twenty-five years ahead of the United States in that respect. Our idea would be that each government-owned industry would be self-contained and settle its own wages and prices. The more undesirable industries might have trouble getting workmen, of course. Some of our more imaginative thinkers foresee all men being required to spend a year or two at the more undesirable jobs—like coal mining. The unpleasant work must be done and it would be only fair to distribute it.

In the case of the middle-class unions it is the idea to keep them distinct from labor unions but to have them all pull together where their interests are the same. The same rule would apply to foremen's and managers' unions. Of course these classes are numerically less and would be outvoted, but on account of their training they should have more influence.

Russia has had to resort to the old capitalistic scheme of paying executives and technical experts big wages in order to secure them. Labor doesn't want to find itself in the Italian position where the workmen after they had seized the factories couldn't run them for lack of experts.

Under government ownership the consumer would be protected by representation on the supreme council which would perhaps consist of 25 per cent technical members, 25 per cent consumers' members, and 50 per cent hand workers. Each industry would look out for its own unemployed instead of making them a burden on the community. Pay would go on in dull times—as the dockers, who want four pounds a week whether they work or not, have proposed. Production limitation is the fault of capital quite as much as of labor. The labouring party has no revolutionary program. We plan, rather, a gradual assumption of management as the workers are prepared for it. Many want to go too fast—that has been the trouble in Russia. General education is needed.

A Leader of the Coal Strike

Another leader whom I interviewed after the coal strike had begun dealt with the subject rather more concretely:

The railway strike would have been won in another three days, when the busmen were going out, if the strikers could have been induced to hang on. The coal strike is a very different matter. You can get Piccadilly Johnnies to drive lorries and handle milk cans for a few days, but they won't go down into the mines and dig coal. Mining is a key industry and the strike will show who is the most important factor in the community.

I do not expect a violent revolution. They tried to go too fast in Russia—*but the industrial revolution is now on.* You must not judge the success of the Soviet system by Russia, as it was a tryout in time of war and in a country used to cruelty. Bolshevist atrocities are no worse than the atrocities under the Czar, and those in power are only getting a bit of their own back. The position of the British Labour Party was "No war against Russia. Hands off and give them a fair show to fight it out among themselves," and

public sentiment was behind us. There had been too much supplying of munitions before. The Soviet system of representation by classes has not been discredited [and here he laughed] except—perhaps, in the case of the House of Lords.

We believe that with the technical men—chemists, draughtsmen, and foremen—on the side of labor, industry can be made self-sustaining. There is no occasion for the man who lives on wealth he doesn't create. We believe in government ownership and in managers urged to work by the idea of public service. Managers don't get the money anyway.

Education is of course necessary. How drastic treatment will be required to accomplish our ends depends upon the course taken by the government and the owners of industry. The present British government is not representative of the worker, because the labor minorities in different parliamentary districts have no representation. The Soviet system would improve this condition.

Limited production keeps the men employed. Every time a man increases his output he does some other man out of a job. You won't get production out of the men until all the profits are theirs.

In contrast to this, another man, a sympathizer with labor but characterized by an employer member of Secretary Wilson's Labor Commission as one of the best informed men on labor matters in Europe, greeted me with:

I believe you have found the solution of the labor problem in America. Recently I spent some months visiting your big manufactories and I found you maintain the personal touch between employer and employee much better than we do and I believe that is the solution. If you will go up to a certain large plant I have in mind and will have lunch in the factory with the owner as I did and will listen to the tone of voice in which his men call him "Bill" I believe you will learn more about the proper handling of the labor problem than you will in traveling all over Europe.

Another thing—a lot of people think organization is the thing best calculated to protect the workingman. So they or-

ganize him. And then the employers organize, and first thing you know you've got two great big machines, equipped to the limit for offense and defense—and then you've got to do something with them to justify their existence, just as they thought they had to justify the existence of European armies in 1914 by setting them in motion—and before you get through you've smashed up both sides and everybody concerned is dead or bankrupt.

No, overorganization is a bad thing and doesn't do anybody any good. When these great big coalition unions are born, the leaders get so far away from the rank and file—and the common man's problems—that it is like a general looking at his army through the wrong end of an opera glass. They think only about winning and the workingman isn't as well off as when he lives next to a real human being like the man I mentioned and hasn't any organization machinery to protect him at all.

There has been so much proselyting here in England and in the past—so much winning the workman to labor's side and away from the employer's side—that the men hate the owners. They suspect every advance they make, so that it is almost impossible to secure understanding and co-operation. America is much in advance of England in that respect.

An Industrial Leader

And, finally, the summing up of the situation by a very great man, indeed—perhaps one of the six greatest industrial captains of Europe:

The labor situation in England is like a septic wound. We have been trying to close it up prematurely—while the poison was still in the wound. A thorough cleansing is necessary. We must have our labor fight out. How it will end I don't know. I am not a prophet but I believe we will come through all right.

Points Brought Out

To my mind the outstanding facts in these analyses of the British situation are:

1. Agreement upon the part of the majority that increased production is necessary if England is to survive.
2. The belief on the part of labor in restricted production.
3. Refusal of the *intelligentia* type of labor leaders to regard the Russian breakdown as proof that the Soviet idea is a failure.
4. Recognition of the lesson of Russia and Italy.
5. Recognition of the necessity of securing the co-operation of managers and technical men if labor is to win. Formation of middle-class unions.
6. Agreement of all that a drastic overturn is unlikely.
7. Trend toward participation in management for the employee.
8. General recognition of the necessity for increased education for the working man.
9. Faith on the part of employers in the common sense of the British working man.
10. Recognition of the necessity for personal contact between the employer and the employee.
11. Recognition—in a single instance—of the dangers of overorganization of employer and employee.
12. General belief that, as organized, labor and capital must fight it out to a finish on the basis of right, with the public as umpire.

Some Conclusions

To these statements certain conclusions reached through personal observation in England should be added:

1. In the most ably managed plants—in those in which scientific management existed or in which exceptionally able managers were in charge—the shop spirit was excellent. The employees were obviously happy and contented, their relations with the plant executives were friendly and strikes unknown except where a whole industry was called out by the union

leaders, where there was interunion strife, or where newly organized clerical unions were learning the art of existence.

2. In the metal industry—the home of ultraconservatism—the shop spirit is the worst I encountered in Europe. The looks the men cast the executives—from directors down to foremen and technical men—were positively murderous. Ca' canny was obviously rife. In one plant the molders had thrown six subsequent departments out of work by slacking off preparatory to making the suggestion to an inquiring management that "a raise might help some," which I was told was the usual procedure in such cases.

3. Most of the modernly managed plants have some sort of system by means of which the employees may bring their difficulties before the management. These vary all the way from the full Whitley plan to monthly committee meetings with department heads. Participation in management, even in the most progressive plants, is limited strictly to suggestion. It is clearly understood by all concerned that the power of veto is entirely in the hands of the directors. All such shop government plans are under union control—committeemen always being union members—often union officials. Wage disputes are handled by the unions—not by the committee system.

4. Educational provisions, welfare work, and housing arrangements in a number of instances are in advance of those in America. England enacted her factory legislation about thirty years before we did, but she will need to exceed us in her care for both the mental and physical welfare of her people for at least that length of time to come if she would have as little contrast between employer and employee as exists in the United States.

The conclusion as to the next step in England is not an easy one—for neither am I a prophet—but I believe after some weeks of contact with men of all classes in most parts of

industrial England that the country will eventually come through its struggle safely. There is no question but that sooner or later the issue must be fought out to the bitter end. There has been too much class against class and too much compromise, with expediency as the ideal instead of righteousness. But the British character is solid at bottom, its conclusions are sane if slow, and once it has made up its mind what is right it will sweep aside the councils of the extreme radical and the extreme reactionary and work out a reasonable and fair course which will make England a better place to live in for that solid citizenry—the respectable middle class —which has made England what she is.

Features of the European Labor Situation

The outstanding features of the whole European labor situation may be summarized as follows:

1. The definite check to wild and impossible altruistic theories administered by the failure of the Russian experiment, which is now generally admitted abroad.

For instance, take the statements at the Second International in October, 1920, by men who had been considered leaders of almost revolutionary labor:

J. H. Thomas—who led the great railway strike in England in 1920, which at the time was expected by some to lead to revolution—said: "The issue between us and the Bolshevists is clear. We must arm against them."

Scheidemann, the famous German socialist, said: "This congress cannot adjourn without first condemning the propaganda of the proletariat dictatorship which the Russians are spreading throughout the world. We must fight the new autocracy of the man who cries 'The Proletariat, it is I.' "

2. The effect of the Italian socialistic experiment which demonstrated at close range the economic necessity

for the existence of management, capital, and technical knowledge.

3. The recognition of the right of all elements of industry to have a voice in its administration.
4. Recognition by labor that intelligent participation in management implies education and responsibility for effective operation.
5. The general, if unconscious, trend everywhere toward the German Organized Economic System or national trust in which all industry is organized both vertically and horizontally for the good of the workers, from apprentices to directors, with due recognition for the rights of all and with due emphasis upon the responsibility of all for the success of the industry, for the success of the nation—and perhaps eventually for the success of the world—which became an industrial world at the inception of the steam age, a hundred years ago.

CHAPTER V

FACTORY BUILDINGS

Elements of Building Efficiency

The efficiency of a factory building depends upon the *cost per unit of production* which it imposes upon each unit of output. This is determined by:

1. The factory's fitness for the effective production of the goods to be manufactured.
2. The overhead charge which the building imposes upon each unit of production.

Effective Production

Under the first heading come the following considerations:

1. Is the building so constructed that each pound of material and each pound of semiprocessed and finished product will—in the course of manufacture—

(a) Be moved the least possible number of feet horizontally and vertically?

(b) Be picked up and set down the least possible number of times?

(c) Be moved by machinery with a minimum expenditure of cheap power—wherever the volume moved is sufficient to warrant the investment in carriers, elevators, and conveyors?

(d) Be moved by gravity wherever possible?

2. Is the building so constructed that all workers can produce at the highest speed, compatible with continued well-being, with a minimum of fatigue? This demands—

(a) Efficient Lighting. This implies:

(1) Building so constructed as to permit the use of natural light for the greatest possible portion of the day.

(2) Artificial lighting so arranged that daylight conditions are as nearly as possible reproduced.

(3) Arrangement of both natural and artificial lighting so that the maximum production speed may be maintained with the least amount of fatigue. (Scientific experiment has shown that, within certain reasonable limits, the smaller an object the greater is the amount of light needed to see it clearly, and the greater the amount of light present the quicker can an object of any size be comprehended. If poor lighting causes a workman to hunt twice as long for small objects he is using or to slow down his machine every time he is doing work of a minute nature, and if it takes him longer to grasp the appearance of material or appliances and to handle them with safety, the definite slowing down in his production per hour and in the productivity of his machine is an expensive matter when multiplied by the number of men and machines at work and the number of working days in a year. Simple instruments have been devised to measure exactly the amount of light in every portion of a room.)

(b) Efficient Heat and Ventilation. Buildings should be so arranged that the temperature, humidity, and ventilation shall be such as to enable the worker to forget them and to produce with a minimum degree of fatigue.

(c) Efficient Flooring. Men standing on uneven, cold, stone floors are more likely to think about their feet than about their work and to be less useful workmen each day they undergo such unnecessary fatigue. Floors should be warm enough, dry enough, and resilient enough to cause the worker no discomfort, and smooth enough so that he can proceed at full speed without giving thought to where he is putting his feet.

(d) Efficient Seating. In designing factory buildings attention should be given to arrangement which will permit some sort of a seat[1] for the use of every workman for at least a part of his time.

(e) Efficient Sanitation. This covers the provision of all facilities which keep the worker continuously in a contented and healthful state of mind and body. It includes luncheon-rooms, lavatories, rest and recreation rooms, first-aid rooms, swimming pools and gymnasiums, safety museums, educational facilities, co-operative stores, and the like.

Overhead Charges

The overhead charges which a building imposes upon each unit of production depend upon:

1. The value of the land upon which the building is constructed.
2. The cost of the building itself.
3. The expense of maintenance—including light, heat, and janitor service.
4. The length of time the building can be used if kept in proper repair.

The value of the land opens not only the question of cost per acre but the whole question of strategic location for the industry. If it were a simple matter of acreage cost the industrial center of America would be in the Arctic or in the middle of our swamps and deserts. But markets—and this takes into consideration facility of transportation, population, climate, and many other things—must be considered. The labor supply must be sufficient. The source of raw materials and the supply of power and water must not be neglected. The cost of acreage which takes these factors into consideration—whatever its price—is eventually likely to be less than

[1]See publications of Gilbreth on the subject in "Transactions of Society of Industrial Engineers" and elsewhere.

where any of them are ignored. It is sometimes possible, however—where strategic location demands placement in the high-rent district—to modify the shape of the building and so economize in land without materially detracting from the standards described under 1. The extreme example of this is, of course, lower Manhattan Island where they almost—as an Englishman said—"have to lower the skyscrapers to let the moon go by."

The actual first cost of the building itself is not by any manner of means so important as its cost per year. The cost per year is made up of the interest on the investment, the cost of repairs sufficient to maintain the building in usable and safe condition and to prevent unduly rapid deterioration from water, frost, acid fumes, and other similar agents, and the replacement depreciation charges. The famous railroad tie case perhaps best illustrates that first cost is by no means last cost.[2]

Type of Tie	Cost per Year per Thousand			
	First Cost per M	Interest	Depre-ciation	Total
Fir Tie—Life, one year.....	$1,000	$60	$1,000	$1,060
Oak Tie—Life, four years.....	4,000	240	250	490
Special Non-Destructible Tie	20,000	1,200	....	1,200

From this it is evident that the oak tie is the cheapest per year to use and that there may be, as in the case of the "non-destructible tie," such a thing as building too durably. It is evident, however, that it is very unsafe either to construct or to buy a factory building without preparing just such figures, because ultimately you must charge every dollar expended for interest and depreciation either against your cost of production

[2]Figures are fictitious.

or else take it out of your profits. The increased cost of production due to loss of operating efficiency on account of unsuitable and unsanitary buildings just as surely comes out of the profits and even more careful analysis of the situation is necessary before building, if unnecessary loss is to be avoided.

Europe Before the War—Efficiency vs. Durability

In Europe in 1914 the custom seemed to be to sacrifice efficiency to durability. This was not so much due to the careful selection of a policy as to the old country custom of building for permanence and then, after a building had been written off the books entirely but still remained serviceable, disliking to spend the money located theoretically in the depreciation reserves—but actually doing good work elsewhere—for a building without which it was possible to brush along. As a result plants built around in a circle—with no room for expansion and overcrowded with workers, ancient buildings with floors hitched together with inclined passages or even by steps—dark and evil-smelling rooms and inadequate heat and ventilation were common.

The same rule seemed to apply also in the case of equipment. One concern I visited in 1914 was shut down because of a breakdown in their power plant. "The engine is over fifty years old and it is rather hard to secure repair parts for it," was the explanation which the superintendent offered.

Then came the war. Organizations housed in old rookeries were needed to operate vast new munition and war material plants. The new plant sprung up beside the old, often while the old one was still in operation. The old plant was torn down or used for storing odds and ends of material while the new plant stood as an example of the best practice of the organized brains of the world.

English Factory Architecture—A Sheffield Plant

A great steel plant in Sheffield is an example of this. On one side of the street is a row of tumble-down brick buildings —of different heights and styles of construction—alike only in small windows, frequent posts and partitions, and general lack of sanitation. Until the war they constituted the principal source of a line of products known throughout the civilized world. But the superintendent of that plant was a man of imagination. He dreamed dreams. During the day he ran the plant, but far into the night—with the help of a draftsman—he committed his dreams to paper. His Sundays he spent on the moors—staking out his dreams with chalk line and peg until he had envisaged every detail of a great steel plant—a steel plant the like of which had never before been created.

When England entered the war he threw himself heart and soul into the production of munitions. His best men went into the army, but he wrought so well with what remained, with women and even with children, that he was called to a government control board. Later he was made head of a board controlling a key industry. He gained in strength and in initiative. The armies called for more munitions—more factories were necessary. The directors of his company listened to his plans. They bought a piece of land across the street from the old plant. On it he staked out the factory he had built on the moors with chalk line and peg. He staked out every furnace, every track, and every sand bin so that the oldest foreman could see just what he planned. He altered to meet their objections and to embody their creative suggestions. When everyone was convinced the builders were called in.

Last October this man—now a director of the company—showed me the completed plant. It is a great structure of steel and brick and concrete—with uniform and well-lighted

buildings radiating from a common center like the spokes of a wheel. There are eight different routes which the various products may take through these buildings—depending upon the nature of the particular product—but so carefully was every detail worked out beforehand that regardless of whether from department A it goes next to department B, or to C, or to D—or even from D to B again—the distance it is transported remains the minimum and it never has to be transported twice over the same ground.

Layout of the Foundry

The foundry, instead of being laid out in the usual way—consisting of a central, or crane-way bay, with one or two parallel side-bays, where the bulk of the molding is done—is composed of one crane-way bay with eight bays set at right angles to it. The four furnaces, two of which are operated each day, are located at the edge of the crane-way bay. This is equipped with heavy overhead cranes, a locomotive crane, with railroad tracks for sand, etc., and with light truck tracks, and is so paved that carts and barrows may roll easily. This concentrates the bulk of the transportation—of which it will be observed there are six kinds—in the crane-way bay and makes it impossible to lack the particular type of transportation most effective for a particular purpose. Ladles and heavy castings are, of course, handled by the principal cranes in the crane-way bay, just as under the usual parallel arrangement of bays—but they are handled much more quickly, the weight being transferred almost at once by means of a double-eye hook to the cranes in one of the eight bays at right angles to the central bay. Consequently the chance of one of the principal cranes tying up another is almost nil, as compared with the usual arrangement where the principal cranes hold the weight during the performance of the complete operation in the central bay, or where the cranes in the single parallel

bay must handle all heavy work not done in the central bay. In other words, in the foundry described there are eight chances to relieve a crane of its burden at once, as against the usual one chance. Moreover, each crane's increased "reservoirs of work"[3] allow its very much more complete utilization with corresponding increase in transportation costs.

These two examples are typical of the construction of the whole plant. It embodies the best of the past with original and courageous enterprise—not the enterprise of the erratic dreamer but of the dreamer with his feet planted solidly on the ground, tempered by experience, knowing the value of the experience and co-operation of others, even to that of the most inconsequential straw boss, and knowing how to enlist that experience and co-operation to a great end. Coupled with these qualities were the necessity and the initiative born of the war. The result is not only a wonderful plant but a manager with an international outlook—with a viewpoint which could have been developed in no other way—who will leaven not only an industry but an industrial nation with dreams realized in hard stone, mortar, and steel—which not even the most skeptical may doubt. The case is typical of industrial Europe. The price of the metamorphosis was ruinous but from the wreckage of five years has been born an industrial progress which under normal development would have required half a century.

High Overhead and Efficiency

Another British plant, which was built several years before the war, embodied certain American ideas—especially that of progressive assembly with the paths of assembly lined with bins containing the assembly parts required at each stage of

[3] "Reservoirs of work" are required in order to permit any unit of industry to exert itself to the utmost. If a man who desires to chop wood lacks a source from which to secure the wood or a place in which he can lay each stick down, once he has chopped it, he necessarily cannot chop wood to the full limit of his physical power. This principle will be discussed more fully in a subsequent chapter.

progress. The plant was a modern concrete structure, well lighted and equipped with conveyors and with elevators which nearly removed the hair from the heads of Europeans not used to American express elevators. It was immensely expensive to construct, however, and the directors shuddered whenever they compared its cost of production (including depreciation) with the cost in their other plants whose construction cost had long since been written off the books. During the war, however, conditions changed. Wages rose by leaps and bounds and efficient operation rather than low overhead became the controlling cost factor. Today this modern factory is the greatest money-maker in an immense consolidation and superintendents from the company's other plants are being sent there to learn the methods which make it possible to manufacture more cheaply in this building than in any other factory. Again first cost is not last cost.

Single-Story Building

Of late England has run quite extensively to one-story buildings as is natural in a country where dark days predominate. Saw-tooth roofs enable them to take advantage of the increased value of skylight as against side-light. The chocolate manufacturers run to small units of such buildings connected by covered passages, which makes for pleasant working conditions and effective operation, provided proper transportation can be arranged. Unfortunately in some of the plants I visited not enough attention had been given to this last feature with the result that long truck hauls and expensive congestion were painfully evident. There is no money in paying the wages of six truckmen who stand at a narrow passage and wait while two trucks are untangled and their loads straightened so that they can proceed.

Some of the soap manufacturers have attempted to get away from this difficulty by the use of single-story units

covering immense areas. Trucking congestion is much less likely under these circumstances and supervision of large numbers of workers is made possible by the use of a gallery. There is a ventilation difficulty, however, similar to that which was encountered when the first attempts were made to get away from the old type of monitor-roofed foundry, where on account of the great open spaces, air currents were so difficult to control that part of the workmen had almost to freeze to death to keep the rest from smothering. This is a difficulty which will undoubtedly be worked out in the factories, just as it was in the case of the foundry, when a scientific study of the air currents was made.

American vs. European Buildings

In some cases American firms have put up the type of building in England which they have developed in America. Wholesale transference of this sort is a mistake unless climatic and temperamental differences are taken into consideration. A wide six-story building covered with glass may be just the thing for America but an interior in England needs more light and one in Italy much less light if the worker is to operate at a maximum of efficiency. Stone pavements may work very well where coolness is a virtue and the workers each provide their own carpeted floor by wearing wooden clogs and thick stockings, as they do in Italy, but are wholly out of place in a damp climate where ordinary footwear is worn. Furthermore, Europe isn't case-hardened to architectural ugliness as we are in America and a factory which is entirely suitable in Detroit would cause a riot in Florence. Even Italian peasants shudder at our buildings when they first arrive here and the imposition upon a peaceful and beauty-loving community abroad of such horrors as we have at times indulged in would hardly be conducive to that popularity which of late our large corporations have felt to be well

worth cultivating in the communities in which they must exist.

The administration building of a certain large steel plant located in the blackest part of the Black Country is typical of certain phases of English progress. The building is built of brick and is well lighted from all sides. The air is pumped in from a stack 150 feet high—in order to have it as free from soot as possible—and is then washed. As a result papers are clean where previously they became almost illegible in a few days. The walls are paneled with Irish, Greek, and Italian marble which allows them to be sponged clean. In the directors' room there is a fireplace—a concession to conservatism and to that particular form of "cosiness" which can be produced in an atmosphere of murk and rain only by an open fire and a glass of Scotch. Altogether it is comfortable, efficient, and typically British.

French Factory Architecture

Early in the war a young French aviator, returning from a reconnaissance in Alsace was attacked by six German aeroplanes. He fell shot through the spine. As a monument to this young man's heroism a great foundry has been erected in Burgundy—L'Usine Henri-Paul—named in honor of the eldest son of one of the greatest steel-makers in the world. The main building is 800 feet long and 500 feet wide. It is built of concrete with red brick panels—a most attractive combination. The skylights are of wire glass and the windows which fill the greater part of the outside walls are of the most modern construction. The cupolas are of the latest design and the flask pits are 30 feet deep.

The Power Station of Le Creusot

This is only one of the modern buildings which have sprung up in the vicinity of Le Creusot during the war. There are over 50,000 people in the city, more than half of whom

work at the plant. This consists of two groups. One comprises the power station in which 25,000 horse-power[4] is generated. (Six thousand additional comes in from a hydro-electric plant in the mountains and 50,000 more will shortly be available from a power station in the Alps near Grenoble. Incidentally the company owns and mines a large part of its own coal.) A typical unit of the power plant is equipped with three 12,000 horse-power gas engines operated with gases from the blast furnaces, ten steam turbines, twelve Babcock and Wilcox water-tube boilers equipped with chain grate stokers, a green fuel economizer and concrete coal bunkers, and a mechanical handling plant for coal and ashes.

In this same group, made up of the older buildings, are the coke ovens and the steel works where there are six open-hearth furnaces capable of turning out 4 tons per hour each on tool steel. The medium forgeshop contains a 12,000-ton Whitworth Manchester press but otherwise is conventional. At the time of my visit it was being operated on locomotive tires and car wheels with a part converted into a plant for the reclamation of locomotive boilers. The heavy forgeshop, which is also a part of this group, produces annually 20,000 tons. The hammer and press department contains a 120-ton steel hammer built in 1876. It is here that the big guns are made, as a gun which throws a 26-inch shell or one which will shoot 80 miles naturally requires special equipment, such as vertical furnaces, pits for quenching in oil, and the like. In the rolling-mills, which have an annual production of 250,000 tons, 60-ton ingots for armor plate are handled. The plant is equipped with an 85-ton crane and an electric rolling-mill is in process of construction. For the most part the buildings in this group are of the old type—brick walls and metal roofs—although here and there is one which possesses

[4]Altogether over 200,000 horse-power is generated at the various Schneider establishments in France.

all the latest lighting and ventilation equipment. The railroad yards are very extensive and cars can be set at any point desired.

The Steam-Turbine Shop

The second group of plants consists of the steam-turbine shop, which turns out 300,000 kilowatts of turbines annually. This is a building which would be a credit to any country, made of steel and concrete, with enormous windows and skylights and equipped with cranes, hyrdaulic testing pits for 6,000 kilowatt turbines, and with individual drives for each machine. The locomotive shop, which comes next, is of similar construction except that the semicircular roof, which is being used extensively now in Europe, is in evidence. This plant turns out 350 locomotives a year—something over 25,000 tons—many of which are at present of the Pacific and Mogul type. Next to this are the auxiliary service buildings—a series of one-story saw-tooth roofed brick and concrete buildings where woodworking, repairs, and like work is carried out. This group contains also the fireproof pattern storage.

The steel foundry—with a capacity of 2,000 tons—comes next and is an exceedingly attractive building. Just beyond is perhaps the most modern group of buildings at Le Creusot—the Ateliers de Mecanique Generale, or general machine-shop. The main building—in spite of the fact that it is 700 feet square—is one of the best lighted buildings I have ever visited. It is equipped with cranes up to 120 tons and with Pond and Cincinnati machine tools. It contains a vault for precision instruments, tool-grinding and storage departments designed to make full use of the most complete scientific management practice, and is heated by steam. Its lavatories are the equal of those which exist even where sanitation and civilization are held to be synonymous. The new rolling-mills are next, after which come the new steel works. These con-

tain eight Martin furnaces and produce 300,000 tons of ingots a year. The building is about 700 feet long and the day I was there an electric magnet was crowding scraps of destroyed bridges, German bayonets, and barbed wire posts into trays which were later thrust into the steel furnaces and mechanically dumped.

These new buildings at Le Creusot are quite the equal of anything in the world, not only from a utilitarian but from an artistic standpoint. There may be a few feet of surplus height, but that is something which it is better to have and not want than to need and have to do without. Altogether they will rank very well from the standpoint of each of the six counts enumerated as standards at the beginning of this chapter, i.e.:

1. Cost of handling material.
2. Effectiveness afforded the worker.
3. Land investment.
4. Construction costs.
5. Maintenance expense.
6. Life of building.

A Berliet Plant

The Venissaux plant of the Berliet Automobile Company employs only about 6,000 men, but it is one of the most modern plants in the world. It is located on a flat piece of ground some miles out of Lyons and is partly surrounded by an artistic concrete fence. The buildings are of reinforced concrete and, while not as completely equipped with windows as some of the more northern plants, are entirely suitable to the climate of southern France. The process begins with the blast furnaces, then proceeds over the molding floors to the forgeshop and eventually into the works proper. Outside materials are unloaded at car level directly into storerooms which are a marvel of neatness. Mass production with all

its attendant progressive machining, standardized gauging, chain assembly, and all that made Detroit famous, has been imported from America, together with the necessary Foote and Burt and other types of American machines and the buildings are designed for this type of manufacture. The roomy and attractive employment office is located at the main entrance and two concrete canteens, each of which seats 2,000 men, are attractively placed across the parkway from the factory. The offices are of the most modern type—a single great room for the clerks and glass cages for the higher executives, with everywhere plenty of room provided for future expansion. Some plans still remain to be carried out, but on the whole the buildings rank very high from the standpoint both of beauty and industrial utility.

Blast furnaces seem to be the rule in French motor plants. Even some of those located in the city of Paris are equipped therewith and make most of their own castings. American water-tube boilers and steam turbines are the rule in the more modern French power plants. But no matter how efficient or utilitarian the plant, nor how disagreeable the process, there is always the effort to secure an artistic effect in the buildings and in the grounds about them. In France the love of beauty is so universal and the training in art is of such long standing that it is doubtful if even a glue factory could escape the æsthetic touch.

Italian Factory Architecture

Northern Italy's transformation from an agricultural and pleasure land to an industrial nation is recorded in her factory buildings. Formerly content to form a dumping ground for cheap German goods and to send her sons abroad to earn the means of subsistence at home, she was reborn during the war and is fighting franctically to retain the self-confidence and well-earned pride of achievement gained by standing on

her own feet industrially for five years. During the war she developed as fine factory buildings as any of her allies.

The Ansaldo Plants

The Ansaldo's Victory factory represents all that is modern in machine-shop construction—spacious, well lighted, built of steel and concrete, and equipped with Cincinnati and Plainfield machine tools. The same company's aeroplane factory at Genoa is another of the same type. The concern which in 1908 was made up of a locomotive plant, a shipyard, and three small foundries now consists of over thirty separate establishments—locomotive plants, ordinance works, iron, steel, brass, and aluminum foundries, shipyards in half a dozen places, gas works, electro-technical plants, chemical plants, five aeroplane yards, and motor- and machine-shops.

Ships of over 30,000 tons are built complete at the Ansaldo's Sestri yards, which are equipped with the most modern traveling cranes, with electric turret cranes, with machine tools, with plate-flattening machines, pneumatic tools, and modern devices of every description. The most elegant furniture for transatlantic liners is manufactured there, as well as steel and aluminum furniture for more utilitarian purposes. Oil motors and gas motors up to 400 horse-power are made at the Savola yard, which also serves as central storage yard for raw materials. The company owns it own shipping basin—with an area of 120,000 square meters at Genoa.

The Ansaldo's new steel plant, begun in 1910, is equipped with Martin furnaces, with 15,000-ton forges, and ingots weighing 150 tons are cast. Built of steel and concrete it is divided into twelve departments—furnaces, heavy hydraulic presses, small hydraulic presses, heavy rolling-mills, light rolling-mills, thermo-technical treatments and armor-plate hardening, armor-plate machining, gun machining, marine engine and locomotive machining, files, bolts, and springs, con-

trol and inspection, and research. The projectile plant is seven stories high, 1,200 feet long, and 90 feet wide.

New Fiat Motor-Car Plant

The new Fiat motor-car plant in the Lingotto in Turin is built of concrete and steel. Before it was started a commission of ten men spent two months studying American automobile plants. The largest building is 504 meters long by

Figure 6. Automobile Testing Tracks on Top of the Fiat Plant in Turin

80 meters wide and five stories high. A speedway 1,300 meters long for testing motor cars is in process of construction upon its roof (see Figure 6). The building erected in the shape of an *H*, is equipped with freight elevators of unusual size, is well lighted and massively built, and "offers even America an example of Italian grandeur in conception, and audacity in construction," as our guide aptly phrased it.

Further description of Italian factory buildings would simply consist of repetition. Her new plants combine the

best in the way of utility and strength which modern industry has developed, with the beauty of design which has marked Italian architecture from the days of the Roman Empire. Her buildings are more massive, are higher, and there is less window area—all of which makes for beauty and incidently for coolness and comfort in a climate which is well adapted to such departures from our own practice. Italy's problem is now that of securing raw material and credit with which to keep these palaces of industry at full production.

German Factory Architecture

With true Teutonic thoroughness the Germans began probing into details of factory construction in a systematic manner while some of the rest of us were giving most of our attention to invention and the manufacturing processes. As a result the dates which appear on the modern type of factory building in Germany are more ancient by some years than those which appear on structures of similar merit elsewhere.

The Ludwig Loewe Plant

The Ludwig Loewe machine tool plant in Berlin is perhaps typical. The new factories were erected in 1898—about the time we started to manufacture bicycles on a large scale—and cover 760,000 square feet of ground. Standard gauge tracks from the state railways permit loading and unloading by crane from railroad cars to the light cars which run on some sixteen miles of narrow-gauge track throughout the plant. The factory is equipped with more than eighty cranes —electric, pneumatic, etc.—and fifteen elevators, all connected with a narrow-gauge railway system in such a manner that all loading and unloading on all floors can be done mechanically. The buildings are all connected by subways from cellar to cellar and by bridges located at the second floor level. The

yards have paved streets running between carefully tended lawns.

The buildings, which are of brick and steel, are beautifully finished and of artistic design. The brick work is particularly attractive. There is a special building for each branch of manufacture and these are so grouped as to facilitate the progress of the product and avoid unnecessary transportation. The ground floor of the administration building is taken up

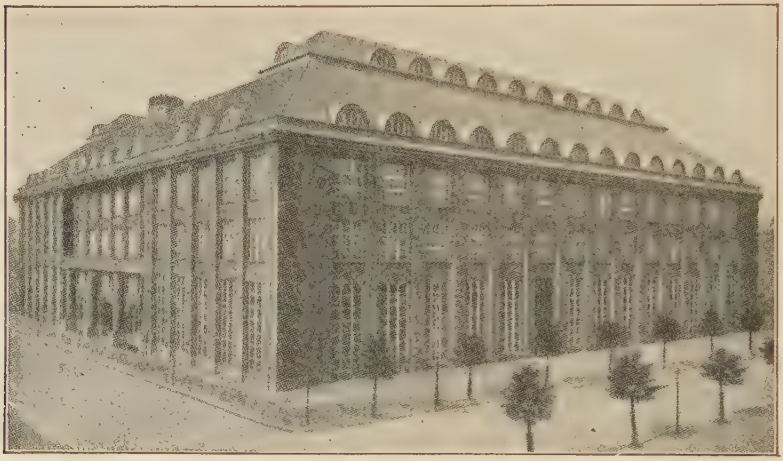

Figure 7. Modern German Factory Architecture

with a storeroom for finished machine tools, small tools, standard parts, repair parts, and office supplies, a lecture hall, employment department, surgical room, and a library for employees. On the second floor are the administrative offices, sales offices, engineering department, stenographic and filing departments, the pay office, and various reception rooms. On the third floor are the bookkeeping department, the commercial department, the publicity department, the patent office, and the drafting-room of the apprentices school. On the fourth floor are the separate dining-rooms for the engineers and administrative officers, for the clerks, and for the feminine

office employees. The apprentice school is also located on this floor. The fifth floor is given to fireproof storerooms for drawings and documents.

Throughout the factory buildings plenty of light is guaranteed by large windows which cover three-quarters of the walls, by skylights, and by well-placed electric lights. Heat and ventilation are taken care of by the indirect system, air being forced in continuously by means of Sturtevant blowers—through steam coils in winter. The buildings throughout the plant are floored with American hard maple, which makes a floor that is comfortable, durable, and easily cleaned. Ceilings are so arranged that all hangers required for the various sorts of transmission can be clamped in place easily, I beams having been left exposed so that I-beam stringers—held in place by clamps—can be laid on top of their lower flanges.

Proper Electrification

The machines are all electrically driven in groups by motors ranging from 5 to 50 horse-power. This is a matter which very often is given too little study in America, where our tendency is to drive the whole room with one or two motors or else to operate each individual machine with a separate motor. There is, however, a point of maximum efficiency which should be worked out in the case of each installation. The individual motor system means either overmotoring each machine in order to provide for the occasional overload, or else running the motor part of the time overloaded with consequent shortening of its life. A judicious grouping of a number of machines on one motor very often makes it possible to avoid extra expense for unnecessarily large motors and to provide for the overload without straining the motor, by taking advantage of the fact that an overload is unlikely to occur on all machines at once. Thus, if five machines, requiring normally 10 horse-power each to operate them, are each

equipped with separate motors it might be necessary to use five 12 horse-power motors to take care of the more or less frequent overload, if shortening the life of the motors were to be avoided. If the five machines were hitched to one motor it would ordinarily be quite safe to use a 55 horse-power motor instead of 60 horse-power of small motors with consequent saving in first cost. Of course it is necessary to take into consideration the cost of extra shafting, the frequency, amount, and duration of overload, the percentage of possible machine-hours each machine is ordinarily operated, and the like, but the matter is one which deserves much more serious study in this country than it has so far received. I have known of several cases where the electrification of a plant was regarded as a failure and the motors were torn out simply because breakdowns from overload were not sufficiently guarded against. There are undoubtedly innumerable cases where large sums have been expended needlessly for motor equipment simply because the engineers involved wanted to play safe and did not apply this principle—which is simply the one which has for years enabled our fire and life insurance companies to operate successfully.

The Power Plant, Foundry, and Machine-Shops

The Loewe power plant, which is equipped with steam turbines and vertical triple expansion engines, is capable of generating 2,250 kilowatts. Dynamos coupled direct with the engines supply the works with current of 500 volts for power and of 110 volts for lighting.

The foundry is equipped with five cupolas, which are charged with electric lifts. Pneumatic stamps and electrically agitated sieves form part of the equipment. The heavy molding department turns out engine cylinders and beds for turbines and machines tools. The light molding department is operated on motor-car cylinders and the like. The usual

pickling and sand blast departments are present, together with pneumatic chisels, emery wheels, etc. The steel storage is provided with special types of cutting-off machines. The smithing department building is heated by a special forced air system and exhaust fans carry off smoke and dust.

The machine-shops, whose buildings form an E shape with the main halls 368 x 102 feet and the wings 51 x 54 feet, are so arranged that each of the five main classes of machine tools built is manufactured in a separate department under a separate staff. The sixth class—special individual orders—is manufactured in a separate department. Machines are elsewhere grouped so that progressive machining is provided for. The erecting department, which is equipped with modern traveling cranes, has a roof completely covered with glass. All raw materials are thoroughly tested both physically and chemically, as are also all coal, coke, and oil before the cars are unloaded. Altogether the plant embodies the latest and best American practice in factory building to an extent which is rather disconcerting when we stop to consider that it has been erected nearly a quarter of a century.

The Brunnenstrasse Factory of the A. E. G.

While the Brunnenstrasse factory of the Allgemeinen Elektricitäts-Gesellschaft was started in 1895, the most striking buildings were erected in 1912 and 1913 after designs by Professor Peter Behrens. About 15,000 men are employed in the six factories—the large machine factory (see Figure 8), factory for railway material, factory for high-tension material (see Figure 9), locomotive factory, small motor factory, and resistance factory—which cover some hundred thousand square meters in the outskirts of Berlin. Mass production—what the Germans call "wholesale manufacture"—is the fundamental principle ruling the methods of production throughout the plant. It has been worked out to the last detail so that

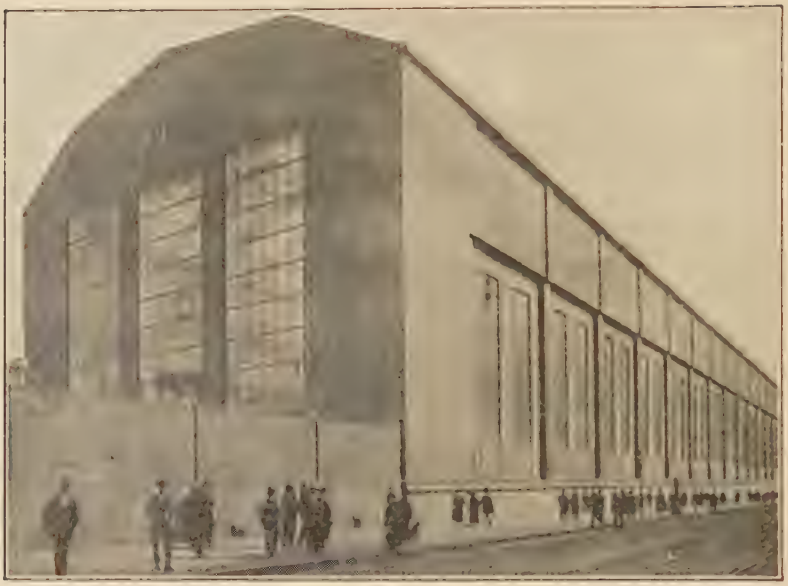

Figure 8. Exterior of the Large Machine Factory of the A. E. G. Plant in Berlin

Figure 9. High-Tension Material Factory of the A. E. G. Plant in Berlin

the result is immense quantities of high-grade articles at an exceedingly low cost of production.

The entrance gate is imposing—twin towers of red brick supporting a Gothic arch with cloaked and gold-laced porter on guard before a stone-paved plaza flanked on one side by great factories and on the other by tall trees. The factories are of red brick—eight stories high, with clock towers and Roman pillars. The high-tension factory, covering some 10,000 square yards of ground, has two little Greek temples cuddling between towers reminiscent of Kenilworth. The windows are of various dimensions, sometimes pleasingly staggered and again arranged in classic rows or grouped under the eaves of a mansard. "The principle adopted in all the new A. E. G. buildings—of equal social and æsthetic importance—is everywhere to provide well-lit, cheerful workrooms which tend to increase the working power of the workman and to add to his personal comfort." The ground floor of this building is occupied by two very large halls which are so lighted from the top and sides that upon entering them there appears to be even more light than outside. Above the halls and between the corner towers are the offices, located at this height for light, cleanliness, and air and to avoid cutting off light from the factory, as is so often the case when the officers are located on the street side of a large factory.

The Small Motor and Large Machine Factories

The small motor factory, which covers 7,500 square yards of ground, extends along Volta Strasse for over a block. Forty or fifty massive brick pillars—spaced wide for multitudinous windows set in metal and standing five stories high—support the glass roof. Inside the motors pass from machine to machine on small cars until completed. Automatic machines, some of them requiring a very small part of an operator's attention, are the rule. The factory is well pro-

vided with reservoir storerooms between departments so that accumulations in the workrooms with consequent difficulty of operation are avoided.

The large machine factory is one of the older buildings—built in 1896 of bridge steel. In the large hall—22,000 square yards in area—the large electrical machines are manufactured. (See Figure 10.) The colossal castings of the huge gener-

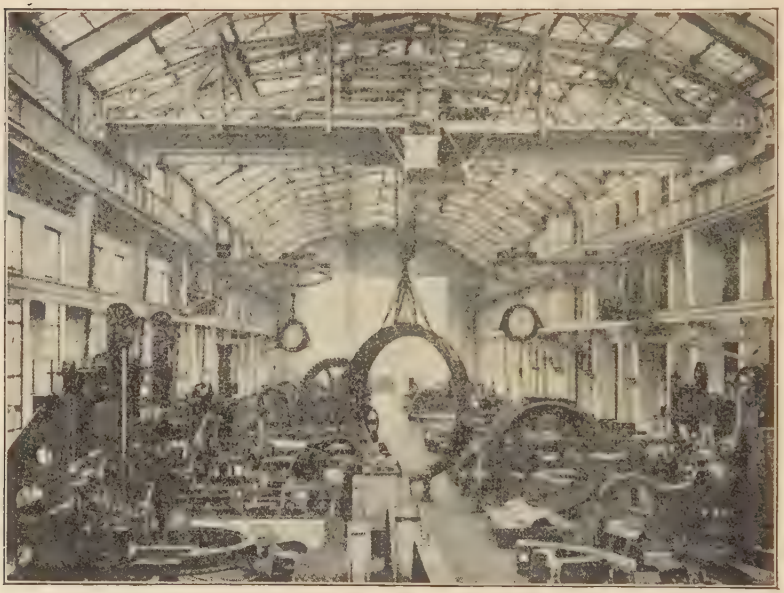

Figure 10. Erecting Floor of the Large Machine Factory of the A. E. G. in Berlin

ators rise nearly to the roof. Spaces between jobs are kept clear, with only the parts which are next needed delivered for use. The largest generators and motors are manufactured in the center and the smaller ones at the sides. The building is well equipped with cranes, the largest of which have a capacity of 75 tons. The final assembly hall of this factory was built in 1912 and is the last word in factory building.

The exterior is of brick with steel windows arranged in double panels between pilasters. The hip roof is in four sections and is almost solid glass. The steel frame of the building, which can be seen from the interior (see Figure 10), is covered with tile and plaster painted white. The principal crane has a capacity of 85 tons and projecting from the side-walls are cantilever cranes of 3-ton capacity.

Figure 11. Switch Engine Driven by Storage Battery and Electrically Operated Turntable in Yard of A. E. G. Plant in Berlin

The power plant generates 10,000 kilowatts at 2,750 volts, which is transformed down to 190 volts after it reaches its destination in the various buildings. Coal is unloaded mechanically and stored in underground storerooms until needed, when it is fed to the boilers by means of automatic stokers. All pipes, wires, etc., are located in underground tunnels of considerable size.

Transportation

Standard-gauge railway tracks reach every department and the cars are shunted within the yard by means of electric locomotives driven by accumulators (see Figure 11). Turntables are mechanically operated by means of a controller. Goods are dispatched from the factories, all switching being in the hands of the state railway board. Special warehouses

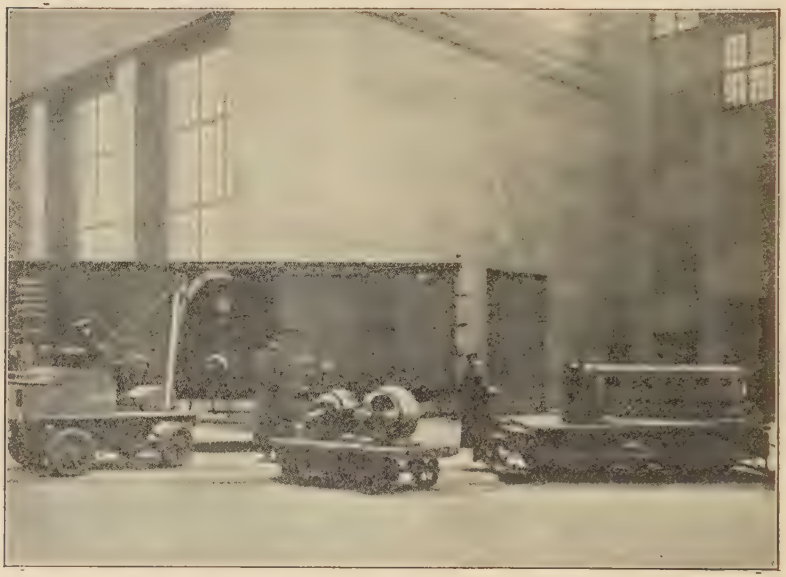

Figure 12. Methods of Transportation in the Yard of the A. E. G. Plant in Berlin

for manufactured stock are provided, equipped with traveling cranes. Box-cars are lowered upon special platforms until their floors are level with the floors of these warehouses, which permits the motors to be rolled in directly. Flat cars are loaded with the crane. The yard is well equipped with traveling cranes, some of them of 30-ton capacity, for unloading and storing raw materials. In addition there are electrically driven motor trucks equipped with small cranes, electric trucks

and trailers, and electrically driven narrow-gauge cars for the transportation of materials about the plant.

The plant is equipped completely with cafeterias, first-aid rooms, apprentice schools, restrooms, and even with a roof garden, all of which will be described later. Order, system, and organization are the keynotes of the Brunnenstrasse plant. You might spend a month there and still marvel at the thoroughness and science with which every problem of building and arrangement has been attacked and conquered.

"Efficiency of Use"

One thing the Germans always make a point of mentioning —the area in actual use for manufacturing as compared with the theoretical floor area and ground area of the building. This "efficiency of use" is very important where real estate values are high and where it is desirable to use as little building material as possible. Every farmer is familiar with the fact that a field containing 10,000 square yards, if ten yards wide, requires 2,020 yards of fence, while the same area in the form of a square field 100 x 100 requires only 400 yards of fence, but this is a principle seldom taken into consideration by capital when purchasing real estate or planning side-walls for factory buildings. In fact a careful analysis of the amount of floor space actually in use for manufacturing purposes, as compared with aisle space and wasted space, in most factories usually brings forth some startling percentages and results in a general rearrangement by which considerable room is salvaged for manufacturing operations and an improvement in operating efficiency secured.

This sort of analysis has perhaps been most general in this country in the case of offices in high rental buildings where it is disagreeably and frequently impressed upon the tenant that every square foot means dollars. In this field it has even reached the point where certain of our larger

concerns—occupying offices in the great skyscrapers of New York and Chicago—are making a regular practice of calling in industrial engineers, just before their leases expire, with a view to rearrangement which will save space and increase the efficiency of operation.

American Factory Architecture

In America, building types have been pretty well classified and standardized as to materials as:

1. Steel-frame fireproofed type—fire-resistent—little used except for skyscrapers on account of its expense. Steel skeleton is covered with fireproof tile, floors are of reinforced concrete, exterior usually of brick, stone, or terra cotta.
2. Reinforced concrete type—fire-resistent—all structural work of reinforced concrete and so heavier than the steel-frame type. Flat slab ceilings and roof, exterior walls of concrete or concrete faced with brick, stucco, etc. Perhaps the most generally used type for factory buildings at present.
3. Steel-frame exposed type—fire-retardent—usually cheaper than above types but not so fireproof, as unprotected steel members lose their strength at about 1,000 degrees F. Walls of brick, concrete, corrugated iron, etc.
4. Slow-burning mill type—fire-retardent when equipped with automatic sprinklers. Constructed of heavy timbers and protected by fire doors, etc. Formerly the cheapest type of building considered a good insurance risk.
5. Miscellaneous temporary types—ranging all the way from the Hog Island buildings built of paper (boxboard) with an estimated life of four years, through wooden frame buildings to certain types of steel

buildings. All to be avoided—except in unusual circumstances—on account of their high cost per year.

As to form we seem to have pretty well adopted the saw-toothed or monitor glass-roofed single-story building for the heavy machine and foundry work. As the equipment used becomes lighter we take advantage of the fact that we can save the cost of roof construction per thousand feet of floor space by putting more floors under a single roof. Of late we have been paying more attention to insuring an adequate supply of daylight—building narrower buildings or providing an interior court, which saves on side-walls although at the expense of roof construction. We have studied lighting—not only from the standpoint of quantity required but from the standpoint of diffusion and the reflective power of surfaces.[5] Heat and ventilation have reached a very high degree of development in America, where we prefer to wear B. V. D.'s and burn coal rather than wear red woolens and save it. Some factories are even trying to induce girls to discard French heels and are providing their employees with chairs designed really to reduce fatigue.

Within the last few years especial attention has been given to appearances both exterior and interior. We have found that machines painted attractively in light colors induce order, efficiency, and pride in work. And the expense has not been in proportion to the gain. One factory was designed in two styles—one purely utilitarian—a blot on the landscape sufficient to kill all community pride which existed—and one adding certain pleasing architectural features to the utilitarian framework. The cost of following the second plan was only

[5] New York, Pennsylvania, New Jersey, California, Oregon, and Wisconsin have laws regulating factory lighting. A survey of nearly 100,000 industrial accidents showed nearly 24 per cent of them were attributable to inadequate or improper illumination. The foot-candle meter has reduced illumination to an exact science and an immense amount of data has been gathered by the lighting engineers and published in the form of transactions of their national society.

4 per cent more and that building is now one of the handsomest factory buildings in the world with a clock tower instead of a water tank and architectural features that would not be out of place in Oxford, Milan, or Paris. Plants like that of the General Electric Company at Erie, the Busch-Sulzer Brothers, Diesel Engine Company, the Hump Hairpin Company, the Continental Motor Company, the Brown and Bigelow Company, the Sillcocks and Miller Company, and the Kimball Building are not to be surpassed anywhere in the world.

Value of Efficient and Pleasing Construction

Probably no human development has been swifter or has entrenched itself more solidly as an accepted institution during the last ten years than the efficient factory building. A building is something which not even the most skeptical may doubt since all may see and examine it in detail. It cannot be disregarded—like Cassandra or Savonarolla. A neat, well-lighted workroom is easier to understand than a revolutionary sales policy or a superior method of administration—so that the gospel spread with lightning rapidity and marked its progress with enduring monuments. America and Germany have been the leaders in modern industrial construction—America because industrial units have sprung up so lately and grown so quickly—with labor expensive and scarce and money plentiful—Germany because of her love of scientific investigation, her attention to detail, and her realization of the necessity for meeting world competition. Other nations have followed this lead during the war until now the efficient, architecturally beautiful factory building—worthy to be the community center of an industrial community in an industrial world—has become an international and permanent asset. It is a good investment and will return dividends—not only in immediate profits but in the future welfare of the race.

CHAPTER VI

PURCHASE AND STORAGE

An Example of Purchase Control

The principles which underlie the purchase of materials and supplies and which affect their economical storage and distribution in the plant are perhaps best illustrated by a concrete and personal example which reduces the procedure and its purpose to its elements. Let us assume then that in the calm days which preceded the great war, one Adam T. Wadleigh—a most methodical man—each Saturday afternoon, after outstaying the other clerks exactly half an hour, in order to avoid impairing the reputation for conscientiousness which he had established during twenty-five years' service with "his firm," proceeded to Harrigan's Smoke Shop and purchased, from Ed. Harrigan himself, a box of Robert G. Child's guaranteed cigars. These cigars, which he knew were honestly made of innocuous tobacco, and which he had convinced himself, by casual inquiry elsewhere, could be purchased as cheaply at Harrigan's as anywhere, he paid for in cash and bore away to his "bachelor apartments." He locked his perfectos away in an ancient humidor. During the next seven days, after each meal, he abstracted one cigar, which he lit at the grate or the gas jet and smoked to the bitter end—with the aid of a weichsel holder and a bent pin. Inasmuch as he allowed himself double rations on Sunday and presented the janitor at the office with a cigar on Saturday he smoked his last cigar an hour before he again repaired to Mr. Harrigan's for his weekly supply. Inadvertently—and certainly unintentionally—Mr. Wadleigh then furnishes us gratis the perfect example of material purchase control and conservation because—

1. The material required was in stock and readily accessible when needed.
2. When the stock needed replacement the order was placed promptly and in such a way as to preclude misunderstanding.
3. All purchases were duly authorized.
4. The material was bought from a reliable firm which could be depended upon:
   (a) To have a stock on hand.
   (b) To make immediate delivery.
   (c) To maintain quality.
5. The material was bought at the lowest price consistent with dependability.
6. Delivery was made safely and quickly.
7. The goods were economically stored and in such a manner that:
   (a) They could be withdrawn from storage with the least expenditure of labor.
   (b) They could be withdrawn without delay in locating or in transporting to point of use.
   (c) They were in no danger of deterioration.
   (d) They were not likely to be destroyed or stolen.
8. The store's layout was such that any unusual withdrawal from stores would be evident at once—making local demand without local supply impossible.
9. Demand had been standardized.
10. The most efficient lot had been determined, taking into consideration economy of purchase, conservation in storage, cost of storing and transporting, and the like.
11. Transportation was effected most quickly, most economically, and in the surest manner.

12. Advantage was taken of all discounts. Postage, clerical and stenographic work was reduced to a minimum, as was also the demand upon the time of purchaser and of purchasee.
13. The chance of error was reduced to a minimum.
14. Credit risk was avoided.
15. System and red tape was reduced to the vanishing point.
16. The material was used for the purpose for which it was intended and there was no wastage.
17. Quality and quantity per unit purchased was such that in its use the least amount of clerical labor was required and the least amount of auxiliary labor and supplies consumed.
18. Costs were predetermined and operation was always 100 per cent efficient.

Degree of Elaboration

The only difference then between the simple common sense purchase of the individual, as illustrated by Mr. Wadleigh's weekly peregrination, and that of the $100,000,000 corporation is one of elaboration. In each case the principles are the same. That practical economist—be he industrial engineer or executive—who is personally responsible for the efficiency of operation of each great concern must convince himself that the elaboration is just sufficient, that the system is "tight," but that it contains not one more form or one more countercheck than is absolutely necessary. Otherwise the purchase, stores, and material conservation system is failing to earn its full dividend.

Just how much elaboration is necessary in installing an economical purchase and stores system depends upon the type and size of the business. While the principles do not vary, local conditions vary greatly and trade customs in each line

of business differ widely, so that certain concessions usually have to be made to suit each case.

Physical-Perpetual Inventories

Not very long ago I read a prolonged discussion of the relative merits of physical inventories taken periodically and of perpetual inventories in which the balance is taken at will from the stores cards. In this article the inaccuracies of actual count made under pressure were contrasted with the inaccuracies of accumulated accounting errors on the cards. The horrors of "actual count" inventories, during which the "whole works" shuts down and nerve-racked clerks count hectically all night while customers clamor and operatives secure jobs elsewhere, were graphically described. Anyone who has experienced one of these feverish interludes will sympathize with the author who obviously spoke from the heart. Not so long ago I witnessed such a Marathon which began with colored gentlemen counting bolts under the supervision of silk-shirted salesmen and ended with near nervous prostration for the auditor with the "actual count" inventory something over 12 per cent at variation with the "book count." Fortunately such spasms have been entirely unnecessary since the introduction of the physical-perpetual inventory.

Under it the storekeepers every morning select a hundred or so articles of which the stock is visibly low, or which is for the most part in unbroken packages or otherwise arranged in units making quick counting easy. They make actual count of such articles and enter the result in red ink on the stores cards, thereby wiping out any errors which have accumulated. By doing this systematically every article in stores can be counted once a month, or once in three months, or as often as experience with local conditions makes the auditor feel is necessary. The physical inventory is continuous and disturbs nothing instead of being occasional and cataclysmic. At the

end of the period everything has been counted and all the advantages of both systems have been obtained with a minimum of their defects.

The plan is so simple that it is remarkable that it is not in more general use, involving as it does only the principle used by the Overland Limited, which takes water at full speed and changes diners and stoked engines at division points instead of emulating those early trains that ran only in the daytime and stopped for meals. In auditing under the physical-perpetual system, as in railroading, the work goes on while all is in motion, and the traveling auditor drops in unexpectedly but regularly and checks stock cards selected at random against the material in the rack and the supplies in the bins. We have outgrown periodic traveling, why continue periodic inventorying?

Daily Material Disbursements—Value

The matter of keeping the management informed daily as to the value of supply and material disbursements is exceedingly important. For some reason managers are accustomed to keeping in close touch with expenditures for labor, but in the majority of cases they seem to have long since despaired of being able to discover the value of material and supplies used until from four to seven weeks after the material is used, wasted, or stolen. Some quite large firms still wait until "their bills are all in" before figuring what has been expended. Inherited customs die hard and the American tradition has been to have the least intelligent clerk buy the labor while the proprietor personally watches the pay-roll—or to buy the material in person and leave the accounting thereof for casual inspection in the far future when the story can have little but historical interest.

What is the use of going out and consulting with Bill or Hank about the waste of oil in their departments six weeks

after the peak charge was incurred? Why should Pete or Hank try to be economical if the "old man" does not know how much oil should be used? How can the old man know how much should be used if he is not informed day by day how much has been used with satisfactory results? Apply the same sort of questions to almost any indirect material and the necessity of having data which makes it necessary for the statistical department to tabulate by periods, and for the industrial engineering department to investigate with facts at their command, will be evident.

Standard Maximum and Minimum Stock

The determination of the standard maximum and minimum stock is a matter which should not be neglected. A printing concern not long ago was saved over $10,000 through such a determination by an engineer whom I know. The work of standardizing the stock had just been completed when notice of a contemplated rise in the price of paper was received, and the concern, knowing its requirements with reasonable certainty, was able to order a year's supply. The stock cards themselves after a few months contain sufficient data to make it fairly evident how long is required to secure a new stock under normal conditions. The greater the period covered by the record the more certain and valuable the information that careful analysis will bring forth. It is well, if purchases are large, to have a place on the stock cards for the various lots on which special discount may be obtained. This makes it possible to buy more cheaply when an order is of such magnitude that the addition of a few units will bring the order within the next discount area.

Systematic Preparation for Purchasing

The actual purchase of the material is a matter of strategy and psychology. The strategy consists in careful and syste-

matic preparation for the attack. The psychology is the complement of the psychology of salesmanship, concerning which whole libraries have been written. By this I do not mean that because a salesman is professionally a pleasant fellow, a purchasing agent must necessarily be a crab. He has quite as much need for wide acquaintance and warm friends as the salesman, and will be very short-sighted if he allows his knowledge of sales methods to destroy his humanitarian outlook and to pervert him to that cheap cynicism which delights in the discomfiture of those whose livelihood depends upon one's favor.

The strategy of purchase varies with the business and with the ability of those who direct the business. Some fourteen years ago when I was trying to get some of the final departments of a factory in the Alleghenies to synchonize with the rest of the plant, the officer of the company who did the purchasing phoned me during dinner to be ready to go to Buffalo in an hour. All that night our touring car roared and careened through the fog. At 7 A. M. he walked into the largest junk shop in Buffalo:

"Gimme a 10 horse-power D. C. motor. Put it in the tonneau." All that day we climbed and skirted mountain streams and all that night the faithful Jake tinkered with bearings and counter-shafts. The second morning our machinery was in operation. That is one sort of purchasing.

Last winter while I was waiting to lecture before the Graduate School of Commerce and Finance at a certain university, the vice-president of a great jobbing house told me of an organization for gathering statistics which determined purchases amounting to millions annually. The daily reports of thousands of salesmen were analyzed continuously—crop reports, rainfall statistics, political opinion, were gathered into the hopper, and out of this mass were evolved hard, cold basic facts, which told that company with absolute certainty what to

load up on and what to leave alone. How would you like to have a statistical machine which would tell you thirty days before election the autumn of every presidential year just how every state was going to vote, without missing the prediction more than two electoral votes in twenty-five years? What chance has the "gimme a motor" type of purchasing strategist against scientifically predetermined conditions such as that?

Examination and Follow-Up

A friend of mine once worked for a grocer who kept what he called a "boob register." The volume which had earned itself this dignified pseudonym hung by a string behind the counter and contained the names of those women who, experience had taught the proprietor, neither counted the eggs nor weighed the sugar. A special clerk known as "the swindler"—as my friend declared by all that was holy—waited on these women and systematically short-weighted them, so that the thrifty proprietor in a measure recouped himself for the losses occasioned by such other customers as found it cheaper to flit than to pay bills. Statistics as to the reliability of firms and their pet "thrifts" are necessary if the purchaser is to buy safely and is to avoid a place in the "boob registers" of certain "slick" firms with consequent disillusionment and cost to his company and to himself.

Under excessive market demand the follow-up may become the largest duty of the purchasing department. Several years ago conditions in the automobile business were such that each firm in Detroit kept a force of stock-chasers and inspectors in every factory from which parts were bought. The disorder and bickering which resulted from having a crew of this sort in each factory, fighting with each other and with the superintendent whenever they felt that a rival was being favored, is better imagined than described. Even worse conditions prevailed in firms running on war orders for several branches of

the service. The remedy is, of course, careful and relentless scheduling with an occasional heart-to-heart talk between the heads of the purchasing and selling concerns when inspectors become overzealous.

There is no standard purchasing system which can be guaranteed to meet the needs of every business. A system which is logical and which contains a minimum of opportunities for error and for dishonesty can in every case be worked out with comparatively few forms and with but little reduplication of work if the principles illustrated by the simple performance of Mr. Wadleigh are kept firmly in mind and if the value to the management of adequate, accurate, immediate records is realized to the fullest extent.

Horizontal Foot-Pounds

Scientific storage is largely a matter of predetermining conditions and of routing. To make clear exactly what is meant, suppose we dodge Rankin's terms and all symbols involving consideration of velocity and resistance and invent a very unscientific unit of work which we will call the "horizontal foot-pound"—allowing the term to describe the effort, human or otherwise, required to transport, by any constant means, one pound of goods one foot. In planning a storage yard or storeroom, the prime requisite, if unnecessary effort in the transportation of goods is to be considered, is to arrange a layout which in actual operation will require the minimum of expenditure of "h.f.p." year in and year out.

Determination of Weight

This requires first *a determination of the weight of each material which can be stored on each square foot of space, when piled to the height which is most efficient, taking into consideration the means of stacking, mechanical or otherwise, which are available.*

It is obvious that it would not be economical to store 50 tons of empty barrels piled 6 feet high for the first 500 feet about a railway loading and unloading platform, thereby forcing the same weight of pig lead to be stored 600 feet away from the point of arrival and departure when the demand by weight for each was the same. Such an arrangement would involve the transportation of a heavy weight 500 feet every time any lead was required, while if the lead were stored close to the platform the entire 50 tons would, if also piled 6 feet high, occupy a few square feet only, making it unnecessary to go more than 10 or 15 feet when barrels were required. The rule then, other things being equal, should be to concentrate the goods of which the greatest weight can be stored in a unit of space the closest to the points of arrival and departure, as in this way the fewest pounds will be moved the fewest feet.

Rate of Turnover

The second requisite for scientific storage is a determination of the rate of turnover of each material. This is a principle which is known to every country storekeeper who keeps his cigars and candy near the front door and his Christmas goods and crockery in the attic in order to save himself steps. In the case of the candy the turnover is about 10 or 12 times a year, while crockery stock is not turned over once a year. According to this principle, if our 50 tons of pig lead were required only once in 10 years, while the 50 tons of barrels were all removed from storage once a day, it would be more economical to pile the lead somewhere out in the Bronx of the storage yard, while the barrels were stored at its Broadway and Forty-Second Street intersection.

Applying the Principles

The enumeration of these two principles brings us to the practical method of application. This is perhaps best illustrated

by an arrangement of a yard which covered about five acres upon which were stored over $300,000 worth of miscellaneous products. These were first listed according to the weight which could most economically be stored on a certain number of square feet of ground. They were then listed according to the previous years' sales in tons and from these two lists was worked out the priority of right of each to storage space nearest to the points of manufacture and departure, which were close together. The final arrangement follows:

Place	Material	Weight per Unit of Storage Yard	Material	Previous Sales (in Tons)	Priority of Place
1	A	13.96	B	3613	B
2	B	13.05	O	3380	O
3	C	12.95	H	2050	H
4	D	12.25	G	1778	E
5	E	12.18	E	1676	Y
6	F	12.00	Y	1487	P
7	G	10.75	P	1339	U
8	H	10.75	U	1324	C
9	I	10.71	C	1242	W
10	J	10.25	I	1019	Y
11	K	10.10	CC	869	G
12	L	10.06	W	865	I
13	M	9.95	N	857	M
14	N	9.74	BB	724	J
15	O	9.66	J	673	K
16	P	9.57	M	635	CC
17	Q	9.57	K	529	BB
18	R	9.40	X	279	X
19	S	9.23	A	251	Q
20	T	8.80	Q	241	R
21	U	8.16	R	234	Z
22	V	8.13	Z	172	A
23	W	7.99	D	141	D
24	X	7.25	S	125	S
25	Y	7.21	L	123	L
26	Z	7.14	F	113	F
27	AA	6.53	T	37	T
28	BB	5.37	V	37	V
29	CC	5.25	DD	36	DD
30	DD	5.10	AA	30	AA

It is, of course, obvious that the final arrangement is worked out only on an approximate horizontal foot-pound basis. In this particular case it was necessary to take various other factors into consideration, a discussion of which would entail the presentation of a mass of detail out of place here.

Just how far an industrial engineer or a manufacturer is justified in working to the final detail, in applying this prin-

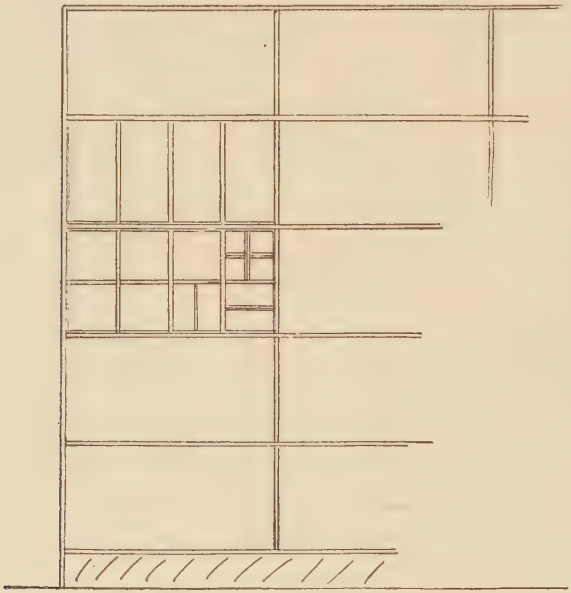

Figure 13. Tabor Company Shelf Storage Unit

ciple—or any principle—depends upon circumstances and the press of other more important work. To my mind the safe rule is to apply the principle in just as great detail as will earn a profit on the cost of doing the work, providing a greater profit cannot be earned elsewhere for the same time and money.

Storage Units

The next step in planning the layout of a storage yard—or of a storeroom—is the determination of storage units. While

ground arrangement naturally depends upon the material to be stored and upon the topography of the storage place, it is usually possible to adhere to some plan of layout which provides for subdivisible standard units. This rule covers everything from shelf storage units as worked out by the Tabor Manufacturing Company to hundred-foot storage sections in a lumber yard.

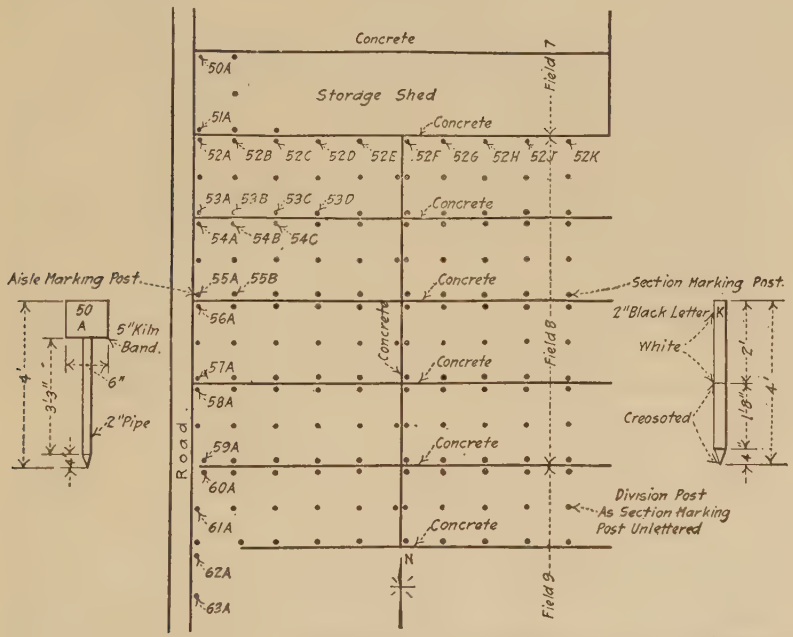

Figure 14. Diagram of a Division of a Scientifically Laid Out Storage Field

The Tabor Company's scheme simply provides stacks of wooden shelves approximately 18 inches deep, two feet apart, and with vertical partitions about every four feet, as shown by Figure 13. Each compartment can be used as it stands, or it may be divided into four 2 x 1 foot compartments by the insertion of eight boxes, and so on. The same principle was applied in the storage fields shown in Figure 14. In

this we laid out each field in eight subdivisions 100 x 250 feet, bounded by concrete aisles. Each subdivision contained ten sections 50 x 50 with every section reachable from an aisle.

Numbering Storage Units

The adoption of a plan of numbering the storage sections, that may be easily learned, is important. One of the oldest and most mistake-proof systems is one used in numbering theater seats, which uses letters one way and numbers the other. A variation of this is used in Figure 14. Such a plan makes it possible for a trucker, who has never been on the field before, to simply follow the road until he comes to the aisle post designated and then turn aside and proceed along the aisle until he reaches the section post. If he is familiar with the sequence of numbers and of the letters of the alphabet he always knows just where he is as regards his destination and the exact direction of his destination. When, therefore, he has received a move ticket marked "52—D" there is little chance of his making an incorrect delivery.

Planning the Layout

The next problem which confronts the man who is planning a stores layout is one that requires analytical ability, courage, and the art of prophecy. If the business be an old-established one—static and in a rut—it is comparatively easy to determine just how much space will be required for each variety of stores. If the business be new, or growing, courage and a prophetic hunch must point the way. In any case, the horns of the dilemma consist of the possibility of either laying out more space than the goods to be stored require, so that wide gaps between the different varieties stored necessitate the expenditure of unnecessary "h.f.p.," or of laying out too little space, which means that eventually one variety of goods will have to be stored in two or three places.

The latter fault is not very serious if an adequate card index showing the aisle and section number of each article stored is provided. Even so a certain graphic feature is lost which in some cases is highly important.

Graphic Repair Part System

About ten years ago a $1,000,000 factory on the Pacific Coast bought most of its machine parts in Ohio and Pennsylvania. Although an effort was made to keep a good supply of repair parts on hand, entirely too often a 200- or 300-pound casting was rushed across the continent by express in answer to an agonized wire. To prevent such occurrences and the attendant production losses, a graphic repair part system was devised. This consisted of a subsection in the storeroom for each type of machine. In this compartment were racks, pegs, and holes, each one of which supported or contained a part or a standard package of parts. These racks, pegs, and holes were grouped and located in such a way that if one of them were empty the fact was evidenced at once to anyone stepping into the compartment. Furthermore, red danger lines were painted which would force the fact upon the observer's attention that the stock was getting dangerously low. Thus if there were ten pegs provided for a certain sort of pinion, and previous experience had taught the storekeeper that it was unsafe to have less than six on hand, eight of the pegs would be painted red so that as soon as a red mark was uncovered it would be impossible to ignore the fact that it was time to order more if the minimum of six were to be maintained. The same scheme can be used to advantage with such supplies as sacks, nails in kegs, and even brooms and smaller supplies, the principle being to provide a container which will disclose a red line or other danger signal which cannot be ignored when the minimum safe stock is reached. It is the same principle as the red sheet in the desk calendar which about

December 1 beseeches you to order a new "complex filler," and inasmuch as an empty peg, compartment, or space painted a flaming red catches the eye, the storeskeeper or even the superintendent, making his periodic progress through the plant, cannot miss seeing the danger and providing accordingly. Express charges and production delays were reduced in the plant in question and modifications of the plan are now in quite general use in the automobile industry.

One of the advantages of the Tabor system of storage cases is that it is possible to expand a section containing a certain supply at comparatively little cost, since each box, being similar to a drawer, may be removed from its position with its contents intact and inserted in another case further on at very little expense. This saves a great deal of handling in the case of bolts and the like. Another plan which reduces rearrangement costs is that of keeping the smaller sorts of supplies sealed in the original packages. This also greatly facilitates inventorying as it makes it necessary to count only the packages and the loose pieces. Articles not arriving in standard packages may be strung on cord, so many in the string, or wrapped and labeled by hundreds or dozens. Groups of larger units, such as piles of castings, may be ringed with paint or waterproof crayon so that removal of a unit from the pile is at once evident. It is also very often advisable to paint the number of castings, or bricks or boards contained in the pile on one of the units where it can be easily noted. In this way if the painted "seal" is unbroken the pile may usually be assumed to contain the quantity so designated.

Piling Methods

In the case of large packages, barrels, castings, boxes, and bales, piling methods must be worked out for each sort and weight stored, and the best place to work out the method is on the storage ground where actual handling difficulties can

be studied. For example, not long ago a man informed me that cylindrical objects should always be pyramided, as it was then necessary to block only the two ends of the bottom tier to prevent the pile from rolling and because cylindrical objects were most easily counted when pyramided. Anyone with practical storage experience would, of course, have known that sewer pipe or shell cases, for instance, when piled in such a

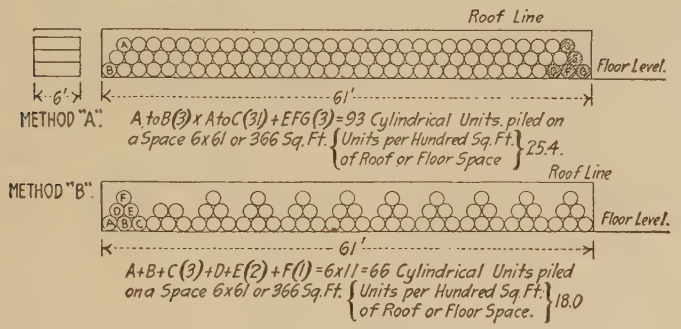
Roof Line
Floor Level.
6'
61'
METHOD "A".
A to B(3) x A to C(31) + EFG(3) = 93 Cylindrical Units. piled on a Space 6x61 or 366 Sq. Ft. { Units per Hundred Sq. Ft. of Roof or Floor Space } 25.4.
Roof Line
METHOD "B".
Floor Level.
61'
A+B+C(3)+D+E(2)+F(1) = 6x11 = 66 Cylindrical Units piled on a Space 6x61 or 366 Sq. Ft. { Units per Hundred Sq. Ft. of Roof or Floor Space. } 18.0

Figure 15. Relative Efficiency of the Two Most Common Methods of Storing Cylindrical Objects

Efficiency of the use of roof and floor space then is:

$$\frac{18}{25.4} = 70 \text{ per cent}$$

in method B as compared with method A. Note simple methods of determining contents of A.

way would be no easier to count than if piled in the form of a truncated pyramid and that the labor of hoisting the materials in question to an apex 30 or 40 feet in the air would be out of all proportion to the advantages gained if the piles were of any magnitude. In the case of small pyramids the waste of ground space, and "h.f.p." on all stores trucked further on in consequence would be excessive. Room must not be wasted if all articles stored are to be moved the shortest possible distance. When stored goods are shedded this is doubly important, as waste of ground then also means waste of roof—which means waste of construction labor and materials. (See Figure 15.)

"Most Efficient Package" Principle

Planning the most economical height of pile for each sort of goods involves the application of the "most efficient package" principle. By this I mean the principle which makes it possible for a man to handle bricks, two at a time, at the rate of 60 tons a day, while it would be physically impossible for him to handle 60 tons of rice, a grain at a time, or 60 tons of grand pianos, one at a time, in the same period. The material itself very often determines the size of the package, but we can sack our rice in convenient units, and we can disassemble our grand pianos if it be strictly necessary for one man to handle them alone. When handling-machinery is available the problem is again modified. Since handling-machinery usually possesses a limited range, as in the case of a traveling crane, or else must be moved, as in the case of a locomotive crane, it is especially necessary to plan in such a way as to conserve storage space.

The very method of moving goods from one part of a storage yard to another very often brings into play the "most efficient package" principle. Contrast, for instance, transportation of goods by wheelbarrow as against transportation by truck. With a material like gravel one man with a wheelbarrow will move perhaps 300 pounds. In a dump-car on a portable track he can push over a ton. In the second case every time he moves his "package" a thousand yards he moves about seven times as much material as in the first case, and with the proper track and grade moves it about as fast. On the other hand, if only a ton or two of material were to be moved to a certain spot, the track-laying would cost more than would be saved by the cheaper transportation.

Method of Transportation

Where great flexibility is required or where the hauls are short, the heavier and more expensive equipment is uneco-

nomical. Milkmen are still peddling to individual customers with the antiquated horse and cart, and the Post-Office Department delivers our mail by means of a man with a sack instead of by motor truck. A stop-watch in the hands of a competent observer will often save the manufacturer an investment in expensive apparatus, which bitter experience will later force him to discard at a loss. Only recently an analytical time study saved one manufacturer an investment of $12,000 in tractors and trailers, which, had they been purchased, would have cost $10,000 a year more to operate than the rather primitive trucking methods in use. The tractor and trailer system is usually a great labor-saver, but in this particular instance it lacked the required flexibility as the time study proved, contrary to the hopes and preliminary judgment of everyone concerned. Locomotive cranes and steam shovels are sometimes most uneconomical. There is one type of portable conveyer which I have seen in at least a dozen factories, but never seen in use. It is one of those things which "listens well" and which can be forcibly demonstrated on paper, but I have never yet found a superintendent who, after thorough tryout, felt he could afford to have it used. There is such a thing as getting out a battleship to kill a bull dog—and it doesn't pay.

Rearrangement of Yard

In rearranging a storage yard the engineer is always confronted with the unfortunate fact that he cannot hold one pile of goods suspended in the air while he transfers something else into its place. If he is willing to spend money enough everything can be moved out and a fresh start made, but this is expensive. In consequence the novice usually commits his plan carefully to paper, nails a blue-print showing the proposed arrangement on the wall, and laboriously explains what he desires to do to the group of foremen who control

the truckers. His words are received in respectful silence and the plan is approved. A couple of mornings later he goes out and finds a hundred tons of material stored in his main traffic artery. He calls in Pat, the foreman, and asks him why, by all that is holy, did he wreck his "city beautiful." Long explanations and profound regrets ensue, and upon expression of proper contrition Pat is allowed to depart. A few days later Mike submarines his Place de la Concorde and the next day Tony applies *kultur* to his Grand Union Station. Then, in the hope that the boss will forget, our brilliant young optimist hangs a Safety-First poster over his blue-print and becomes engrossed in time-studying the milling machines.

There is just one way to rearrange a storage yard, that is, issue a move ticket, or its equivalent in some sort of a written instruction, to every trucker who is allowed to invade the sacred precincts and then to nail the hide of any trucker who lays hand upon anything without such an order, upon its outward wall, where all would-be vandals may see and ponder. I was once an optimist myself and I know!

Control of Stores

In connection with the usual supply storeroom considerable economy can often be effected by the establishment of substations. It is much better to furnish certain sorts of workmen with a locker and to deal them out a keg of nails or a package of some sort of bolts in constant use, than it is to have them leaving their work two or three times a day to take out an apron full of nails or a dozen bolts. In such cases the men in question should be made to account for the use of such articles and should be frequently checked up on the rate of use. This applies, of course, only to such men as car-bracers, carpenters, etc., who are on regular sorts of work which does not allow the accessories to be delivered with the materials.

The use of oil and other supplies, upon which the demand should be fairly constant, should be checked up by departments, by machines, and by individuals, in such a way that unusual fluctuations will be evident and can be investigated at once. Doing this involves an analytical study of the plant with like machines grouped, and usually leads to considerable economies being effected. In one instance such an investigation resulted at once in a change in the sort of oil used for a certain purpose which saved the company $1,500 per year.

All portable stores which cannot be locked within the storeroom proper should be surrounded by barbed wire entanglements of some sort, sufficiently strong to prevent pilfering. This applies to certain sorts of castings and to lumber especially. A regular loss of from 3 to 4 per cent of a plant's lumber stock is by no means uncommon in a "shanty" neighborhood.

Finally a graphic analysis of all stores should be made in such a way as to keep the exact value of each variety of stores before the purchasing agent and management at all times. This should not enter into more detail than is required constantly to inform those in control of the business policy how much money is tied up in the principal varieties of steel, brass, copper, lumber, leather, and the like. Continuous information of this sort is the surest safeguard against unnecessary interest charges and against excessive loss through market fluctuations.

Stores control, considered alike from accounting, physical, and financial standpoints, is constantly becoming more and more of an exact science, and the firm which continually analyzes its methods and keeps abreast of the latest practice will not only effect considerable economies of labor and of materials but is in the best strategic position to meet trade competition.

American Storage Methods

In America the procedure of purchase and the bookkeeping in connection with stores have been worked out very fully. Storage methods—so far as the physical arrangement of stores is concerned—have usually been left to the factory superintendent, who contents himself with providing the yard boss with a "yard" and the storekeeper with a storeroom and then plunges into the manufacturing problems with the result that the yard is laid out and the procedure planned by a man whose strong point is bawling at "rough-necks" and the storeroom by a clerk who is afraid to get his hands dirty. As a result these two departments are usually the least efficient about the plant.

Italian and French Methods

In Italy there are some very neat storerooms and some yards very well equipped with cranes, but in general conditions average no better than in America.

In France conditions in the best plants are similar to those in our own best plants, although in some cases, as at the Berliet plant, graphs are used to indicate what proportion of the stock reserved for the cars entered on the manufacturing program has been issued from stores. These graphs are entered on a 6 x 14 card divided into lot numbers by narrow vertical lines. As these lots are issued to the factory the spaces between lines are blotted out with solid blue shading. The reserved stock on hand is shown by a blue horizontal line—later blotted out as the stock is issued—so that the superintendent can tell by glancing at the card just what proportion has been issued, what is on hand, and what is still to come. The plant uses a "balance of stock card" similar to our own, bearing the requisition number, pieces received, pieces issued, and to whom, balance of stock, etc. All bins in the storerooms—which are spacious, well lighted, and admirably

located and arranged—are numbered serially and are equipped with a neat metal pocket into which cards may be slipped showing the contents of the bin.

At the Renault plant especial attention has been given to yard layout. Aisles and sections are carefully laid out and marked by numbered posts. Castings are arranged in orderly piles and the lot and control number are printed on

Figure 16. Yard Storage and Transportation at the A. E. G.
Note numbered stations

the top castings on each pile. Special steels are painted different colors and there is a color chart in the stores office showing the source of each variety. Wherever heavy material is to be handled, overhead cranes are provided. Trucks and trailers are used for the transportation of the lighter materials.

The Berliet plant is equipped with a thoroughly modern toolroom, in which tools are made and sharpened by specialists and stored ready for use. The same arrangement is also in

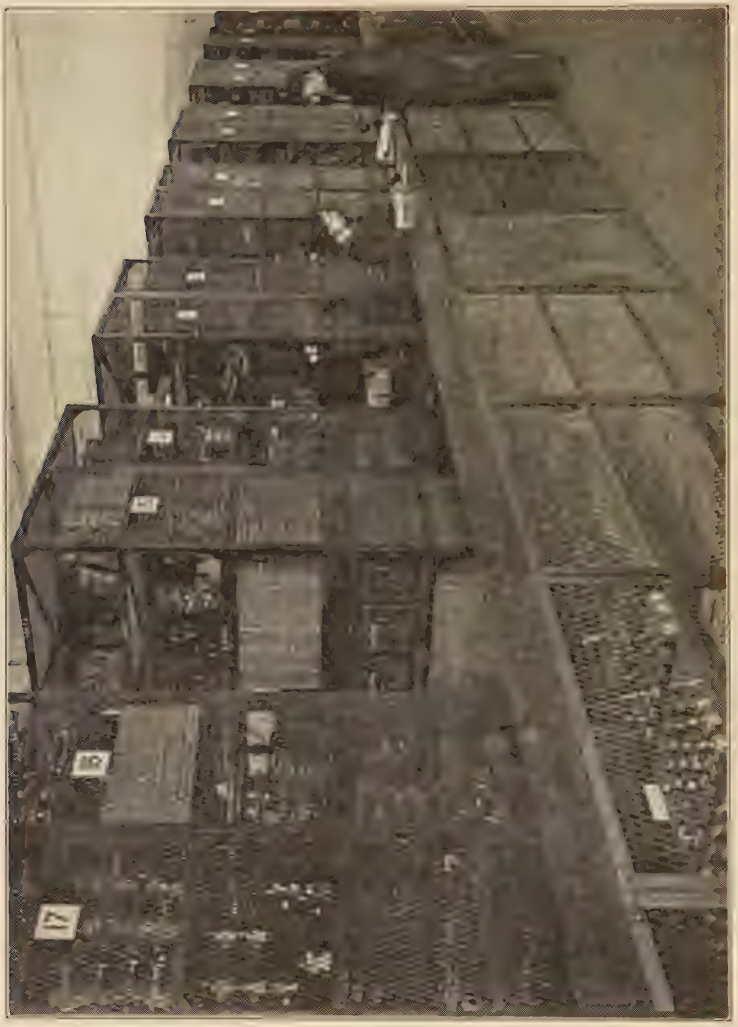

Figure 17. Central Stockroom in the Brunnenstrasse Plant of the A. E. G.

force at the Schneider establishments, where the delivery of the tools required for each job, to the man on the job, is arranged for by the planning department.

German Storage Methods

The German system most nearly qualifies under the standards set forth in the early part of this chapter. In the yard at the Brunnenstrasse Plant of the A. E. G. standard gauge box-cars and gondolas filled with castings, pass directly under the steel frames, which support the traveling cranes. These frames, 350 feet long, are set 100 feet apart 35 feet above the ground, and the cranes have a lifting capacity of 15 tons each. By the use of electric magnets and a collection of exceedingly ingenious grab hooks, buckets, and other devices, the railroad cars containing materials and supplies are unloaded with great expedition and their contents stored—the castings as shown in Figure 16. The methods of shunting cars and of unloading box-cars mechanically are shown in Figures 11 and 12, pages 125 and 126. The orderly arrangement of the castings, the pile number on the plate near the door, and the method of transportation should be especially noted in Figure 16.

Special steels are painted distinguishing colors as in France and a color chart is kept in the storeroom so that the sort and the source are readily determined. In piling round iron, shafting, and other shapes likely to roll, square separating bars about half an inch square with turned up ends are used to separate the layers in the pile. This permits square piles and the disengagement of bars with less danger to the workers.

Figure 17 shows the A. E. G.'s method of arranging a general storeroom. Particular attention should be given to:

1. The method of rack construction—steel frames, wooden shelves, expanded metal partitions admitting light freely to each shelf, etc.

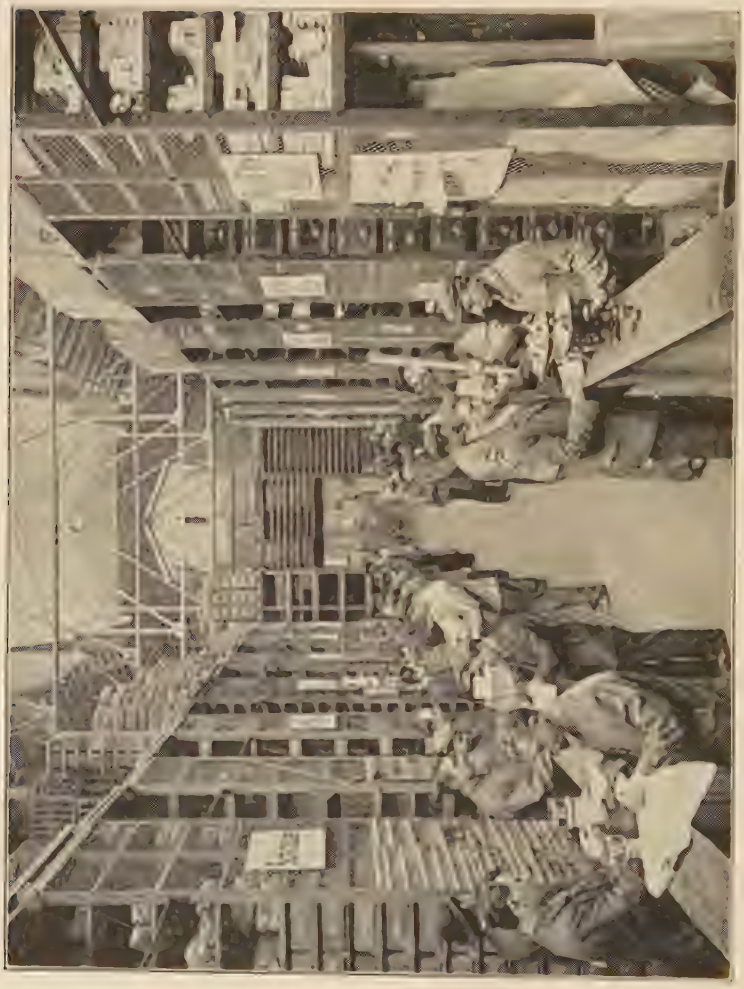

Figure 18. Departmental Stockroom in the Brunnenstrasse Plant of the A. E. G.

2. The division of all stores into lots easily counted either by the use of the boxes in which they arrived, by making into bundles, by the use of portable trays, or by arrangement on the shelves. Note the top shelf under the counter at the left.
3. The serial numbers on each rack, on each shelf section, and on each tray.

Figure 18 represents a substation located in a special department. Particular attention should be given to the case construction as in the previous picture and to:

1. The large signs directing the workmen to the various sections where different classes of supplies are to be obtained.
2. The demonstration boards showing all sizes and varieties of each class of supplies. This enables the man who knows what he wants but whose power of description and sense of dimension are poor to make it clear to the storekeeper the exact thing he wants in the shortest possible time.
3. The adaptability of the cases to diverse classes of goods from large sheets of fiber stored on end to bolts in trays.
4. The creosoted wood block floor, the slippers worn by the workmen, and the lighting arrangement which includes sun curtains.
5. The use of scales for counting castings.

In the A. E. G. plant, patterns are stored in a fireproof building on numbered racks. Each pattern is numbered as is each shelf and tier of racks and all is carefully indexed so that the location of each pattern can be determined in an instant.

When stores are required for a new job the bill of material is sent to the storekeeper in an envelope together with

a tag for each part, numbered in accordance with the bill of material. These tags are attached to the various parts and act as a move ticket directing destination, providing for identification, etc. When the last tag is gone from the envelope the storekeeper knows the material is all on its way to the job.

When the workman enters the plant he is presented with an illustrated tool book which gives the type and number of tools needed ordinarily for his particular job. He immediately goes to the toolroom and gets the tools called for by the book. When he leaves the department he must return the tools or pay for them.

When a job is assigned to a workman he is given a blueprinted list of any special tools required. He draws these tools from the toolroom, depositing in return a brass check, which makes him liable for the prompt return of the special tool.

While workmen call for their own tools at the A. E. G., at the Loewe plant the storeroom is equipped with an electric bell system similar to that used in old-fashioned hotels, where a number drops down in a case indicating which room is ringing. Workmen are then provided with the proper tools, etc., before they begin work on the job. Should they get into difficulties and require other tools or advice from the foreman they can ring a bell located at their station, whereupon a bellboy arrives to serve them—thus making it unnecessary for them to stop their work to go to the storeroom or to hunt the foreman.

The Germans may not call it "scientific management" but there is not much they overlook in the way of staff work—planning everything to the last detail—before action begins. In comparing methods it must be borne in mind always that the German workman is highly skilled and thoroughly trained for the particular work he is to do. Furthermore, the will to work has been ingrained in him since he was a child. Con-

sequently he doesn't need the amount of showing, telling, teaching, and cussing that a man fresh from the plow—whether in Slovakia or Arkansas—needs when he is given a machine to run in a Detroit automobile factory.

English Storage Methods

In England storage methods are in rather an elementary state except for the plants run under scientific management. In one such plant I found the graphic repair part system with red danger lines in use. Each pile and compartment carried a card showing the maximum and minimum stock permissible. When the pile shrank to the minimum, entries of all reserved stock were made on a special tag hanging to the card inserted in the compartment slot. This saved clerical work because reserves were not entered until the minimum was reached. Furthermore, the fact that there were figures on the special tag acted as a danger signal.

Another novelty was a check on the inventory by the use of a valuation at an arbitrary standard base price—usually less than the actual value—for the semiannual counts. The alteration in the value of stock on hand—as compared with the arbitrary basic price—is then figured and the alteration plus the base value (figured from actual count) must check with the stock at the purchased price value as shown by the stock card inventory. Besides furnishing a check approved by the chartered accountants and bringing to light errors in counting, the system accentuates the increase or shrinkage in inventory values as compared with a fixed base. Used stock is figured at the oldest price, or at the next oldest if a second lot is cut into.

In some of the more modern large steel plants exceedingly well-built pattern storage buildings are in evidence. These are laid out and indexed much the same as at the A. E. G. Where the American gallery type of building is used—heavy

machines on the ground floor, which is open to the roof, with balconies around the sides for light machines and handwork—all light stores are taken directly to the gallery storerooms which parallel the progressive assembly. Heavy stores are brought in from the general storeroom as needed.

Perhaps the most perfect stores system I encountered was that at the Renold plant in Manchester. In the first place the purchase and stores department had its own testing laboratory—as separate from the sales and factory laboratories. Furthermore, the storeroom itself was equipped to give every rod received the sparking test as it arrived. Small electric cranes moved the material directly from railroad cars to its destination in the galleries or on the main floor. All bins were numbered serially and the location of the stock was recorded accordingly. The stores office was equipped with a control board uniform with those in the other departments (see Chapter X), upon which the transportation of material needed in the various departments was planned and the work dispatched, just as if the storerooms were a manufacturing department—which, of course, it really is, even though it is generally regarded as an excrescence.

My conclusion in the matter of storage is that the brightest minds in all countries are working along the same lines—as they must—since there is only one best way in anything, where conditions are identical. The average is highest in Germany, where disorderliness of every sort has been *"verboten"* for half a century. France, England, Italy, and America, however, are all waking up to the possibilities of economy. The conditions of demand and distribution are being carefully ascertained, and physical layout and systematic control designed in order to insure the movement of material not only at the exact time it is needed most but also without waste, and at the least cost.

CHAPTER VII

MACHINES

Machinery and Labor

In spite of the outcry of our socialistic friends, it is the machine which has given the workman of today his leisure and his comfort. If you do not believe it contrast the life of the Detroit "wage slave" with his eight-hour day, his "tin Lizzie," and his evening at the movies with the life of the "independent craftsman" who still survives in one of the hulls which even yet linger in the outskirts of Sheffield—fashioning knives twelve or fourteen hours a day over a grindstone and amid sanitary surroundings which would outrage the feelings of a self-respecting Iowa hog. Even if the clatter of the machine disturbs our cloistered sensibilities and even if in the old-fashioned factory the workman must get his thrill from fooling the foreman or sneaking out early like a roystering schoolboy, instead of from pride in work, he is much better off with the machine and the power plant behind each move than he was when power meant strained back muscles.

America's Supremacy in Machine Tools

If there is one thing Europe thoroughly and frankly envies us Americans it is our machine tools. America leads the world in the use of jigs and fixtures, in multiple machining, and in the quantity of metal removed per machine revolution. In every country I visited, manufacturers complained to me because the existing rates of exchange made it impossible to buy our automatics, our milling machines, and our multiple drills. While the Olympia Machine Tool Exhibition in London brought out some splendid machines, some beautifully

finished pieces, and some wonderful examples of British sturdiness and dependability, even the British mechanical journals themselves deplored the fact that there was very little to indicate that progress was being made toward rapid and cheap production.

America, with wages from two to nine times as high as the rest of the world, has had to exert her inventive genius as has no other country. Out of this necessity—coupled with an ingenuity inherited from generations of pioneers who had to devise almost everything they used from the raw materials of the wilderness—has developed machinery whose ingenuity is little short of marvelous. When the flexibility of the human hand can be so counterfeited in steel and other lifeless mediums as has been done in the shoe machines, in machines that will not only box and weigh damp pulverized foods but will line the boxes with waxed paper and seal them, and in machines that will cut and wrap sticky caramels in thinnest tissue, the duplication of almost all hand labor is simply a matter of time and profitableness.

Approach to the Machine Problem

Any machine problem should be considered from the standpoint of economic values under existing or under obtainable conditions. It is obvious that money is wasted by the man who spends his time inventing non-refillable bottles in a prohibition country, or durable hats for ladies. It is none the less true that money is wasted upon machines that ingeniously perform an operation that could have been eliminated entirely had it received more thorough study.

In attacking a material-handling problem—and all machinery investment problems are the same in principle—the sequence of questions should be somewhat as follows:

1. Is the operation necessary?
2. What is the present cost of handling per unit handled?

3. What would the cost be under various other handling systems, taking into consideration:

(a) Interest on the cost of the new plant.
(b) Depreciation on the new plant, obsolescence included.
(c) Upkeep of the new plant.
(d) Power cost to operate the new plant.
(e) Labor cost to operate the new plant.
(f) Cost of interruptions in output with the new plant.
(g) Flexibility of the new plant.
(h) Increase in damage to material handled.

4. Does the most profitable of all the new handling systems we have figured out offer the best investment possible for the money at this time—taking into consideration security and return on the investment?

It does not pay to hunt snipe with a 16-inch gun nor ducks with a battleship. Neither does it pay to install a steam shovel to do a few hours work a week. Wheelbarrows are cheaper than tractors or conveyers on short hauls and with diversified and constantly shifting terminals. Pumps of high efficiency have been installed on sugar plantations only to be thrown out during the dry season and replaced by the old inefficient box-pumps when water, not efficiency, was vital to the survival of the crop. Pan-conveyers of low friction have been discarded in favor of conveyers requiring more power, where conditions were such that continuity of operation was more important than economy of horse-power. Repairs and interrupted output may eat up the profit on the whole installation. It isn't safe to embark in an investment in labor-saving machinery unless the profitableness of the whole transaction is investigated just as carefully as is a new business venture. If this rule is disregarded—as it often is where salesman are glib and existing installations are attractive—the chance of loss is just about equal to the mortality rate of business ventures in general—something over 95 per cent.

Small Tools and Special Tools

Small tools, special tools, and methods which are quite familiar in American shops, are equally well known in some of the European plants. Although the automatic machine tool was an American invention, yet its design and application are well known in European plants. The types found include automatic screw machines, machines for other standard operations, such as planing, drilling, and milling, and also machines for special operations, such as covering cables with lead.

Machine Work in Modern French Factories

At the Berliet automobile plant in France you can see the engine *blocs* carefully centered on the first machine, which drills two small holes in opposite corners. Thereafter time spent in centering is saved—because these two same small holes slip over pegs in every subsequent machine, immediately and accurately centering the *bloc* for each operation. You will see 4 cylinders drilled and ground at a time, 8 valve seats ground at once, and 68 holes drilled simultaneously. All machines are direct electric drive and the absence of the forest of overhead belts is refreshing in contrast with that of many American shops. All handling is done by compressed air hoists hung on trolleys or by conveyer—but that great plant in the outskirts of Lyons is equipped throughout with American machine tools—those of Foote and Burt and others. American automatics—four to the operator, who is often a girl—are standard equipment throughout the plant. Even the blast furnaces were designed by a firm of American engineers.

At the Renault plant you will find room after room of Potter and Johnson automatics, of Rochester and Cincinnati machines. In most cases you will find one man operating two machines. Multiple set-ups are common—a Cincinnati was planing a groove in ten crank cases all clamped to the bed in a row the day I was there. A little further on another

man was facing eight engine *blocs*—two faces at once—on an Ingersoll milling machine. Side frames for motor trucks are forged at one stroke on a hydraulic press. A brass-tube mill is turning out radiator tubes. Twelve-leaf springs are being tested on a special machine which bends them in reverse to an arc equal to the normal, then releases to within one inch of a straight line, and then measures the tension accurately.

Soldering is done with gas irons, high speed riveting with compressed air "pistolets," a drilled plate ingeniously holding the rivet points to the fire, so that the head may not malform nor time be lost in fumbling. Women are doing acetylene-welding and trimming, operating machines, and driving electric trucks. The overhead cranes are operated by women.

Coal is unloaded from canal boats in the Seine by means of a clam-shell bucket operated by a man in a cage that runs on a trolley. An ingenious tank device consisting of a weighted float keeps the water pressure constant in a battery of hydraulic presses.

On the other hand sand-blasting is done on revolving tables, but they are still using the unwieldy mask instead of enclosing the whole operation and watching it from the outside through the window as we do in America.

Hand Work in France

Progressive assembly exists at the Renault plant, although the rate of advance is regulated by the operators, who push the cars along the floor, instead of being regulated by the speed of a power-driven chain. Painting is still being done by hand with brushes, and multiple drills are rare.

Hand-fitting is the rule—but an American motor mechanic, jetsam of the American Expeditionary Force, told me that he had taken down car after car and that the French engines were in better shape after ten, twelve, and even fifteen years of use than the average American car six months out of the

factory. "They use awful hard steel," he said, "and then they just polish and polish and polish until there ain't no friction left—and a cylinder fifteen years old ain't got as much knock as ourn has when they're just out of the works. But who in hell would drive a car fifteen years old in God's country?"—he finished reflectively.

In the older French plants there is very little multiple machining, jigs and fixtures are fewer, and there is more handwork. Such shops very often handle very large pieces in special machines—wheels 25 and 30 feet in diameter are planed on a variety of boring mills, but light cuts and dry tools are the rule.

Machine and Hand Work in Italy

It was perhaps not fair to judge the output per man on machine tools in Italy as the plants were visited just before they were seized by the workmen and while the "slow work" strike was in progress. Under the circumstances the fact that one automatic to the operator and every department overmanned was the general rule could not fairly be taken as a normal state of affairs. The new plants, such as the Ansaldo's Victory factory, are very extensively equipped with American machine tools, from Plainfield, Cincinnati, etc., but nevertheless, in general, handwork is more common than in France. The Italians have devised some very ingenious machines. Some of those used for covering cables with lead at the Pirelli plant are extraordinarily interesting. Some very large machines are in use also—a 15,000-ton electro-hydraulic press, for instance, at an Ansaldo plant at Genoa.

German Machines

In Germany American machine tools are much less used than elsewhere in Europe. In the Loewe plant more than half the machines in use were manufactured in their own

factory. In this plant the rule is two machines per operator on planing, milling, and chucking with four per operator on automatics. At the A. E. G. from three to four automatics per operator was the rule, although this was not lived up to during the labor troubles in the spring of 1920. Very efficient turret lathes, universal milling machines, automatic screw ma-

Figure 19. Toolmaking Department at the Fiat

chines, automatic pin and stud machines, lathes, and shapers are made in Germany. Some very ingenious machines have been worked out—an interesting development being the use of magnetic arms automatically feeding castings into machines.

Machinery in England

In England there are some two-spindle drills in the more modern factories. At one plant in Sheffield I found them

setting up as many as eight pieces on one bed at a time, and they were using a revolving bed for facing castings which permitted two different sides to be faced without removal from the bed. There was one operator to every machine, however, which is again the rule in England.

In a large Manchester plant a battery of eighty automatics averaged six automatics to an operator and helper, but this was very unusual. The superintendent told me he had run as high as ten automatics with the two operators on occasion. He further stated that in his department the work done per man was quite as much as that which was performed before the war.

In the older plants in England there is an atmosphere of vastness and gloom which extends even to the machines. They are impressive, just as a huge damp cathedral is impressive. A New York hotel lobby, however, or a Los Angeles cafeteria—even if less dignified—is a much pleasanter place to haunt regularly. The machines are big and slow and the work is all done with due regard for precedent and the rights bestowed by Magna Charta. The amount of metal removed per cut is large in some cases, because the machines are built enormously strong, but progress is marked by dignity rather than by haste. The ultra-Tory establishment prefers to do a piece of work in four operations rather than in one, if that is the way their grandfathers did it. One such performance I witnessed in the case of an automatic spring, which was inserted in the machines four different times to perform operations all of which could easily have been performed during one insertion in a single machine. There were no multiple drills and no automatics and the man who showed me through told me he hated the word "scientific" and asked me if it were true that one party in America wanted Great Britain to reconquer the United States so that it would again be possible to get a drink.

Mechanical Handling and Transportation Machinery

Progress in mechanical handling has been more conservative in Europe than in America. Until quite recently one of the most popular outdoor sports for more or less erudite globe-trotters was a tour of English and continental ports—especially Antwerp, Southampton, Bremen, and Hamburg—topped off with ribald laughter that New York should esteem herself a port at all, when it came to loading and unloading devices. New York proper still has a long road to travel, but the developments in coal, ore, and grain handling machinery on the Great Lakes are so far in advance of anything seen abroad that when the engineers of the American Expeditionary Force got through reconstructing certain continental ports any number of them were offered jobs by their late allies. One American company since has sold cranes to Rouen, Cherbourg, Brest, Dunkirk, Rochefort, Bordeaux, Nantes, Havre, St. Nazaire, St. Louis du Rhone, Cette, Marseilles, and La Pallice in France alone. One of the largest companies in France has taken over the manufacture and sale of certain devices for picking up and dumping railroad cars bodily and for cranes which insert their grab buckets into the nethermost depths of a ship and bring out—in large chunks—whatever they find there.

It has been estimated that ships can clear at Galveston and Seattle quicker than at any other ports in the world. With electric wharf cranes it is possible to unload the average ship loaded with cotton, sisal, steel billets, bagging, flour, and like commodities in less than twenty-four hours. Coaling machines capable of handling 150 tons per hour can coal the largest ships in a day. Gravity conveyers and continuous elevators have handled as high as 1,500 miscellaneous boxes, bags, and barrels of from 50 to 150 pounds each per hour from the hold of a ship—even as fragile freight as bananas is being handled in this way at the American fruit ports. In

one instance at Beaumont, 2,103 barrels of asphalt weighing over 1,000,000 pounds were unloaded in eight and a half hours at a cost of $25.16. Gantry and turret cranes, overhead trolleys, electric trucks with trailers, conveyers, and special devices created to load and unload specific bulk materials are, together with stacking machines, which pile the goods three or four times as high as it is practicable to stack them by hand, revolutionizing the ports of the world. Such port and terminal machinery will ultimately solve the dock labor question, which on account of its irregularity—twenty-four hours' work one day and then nothing to do for three days—and its severity, has made labor troubles at the docks—with consequent interruption to commerce—the rule, rather than the exception. Other countries are finding all this out and since—other factors being anything like equal—the port which can clear the ships quickest, gets the business, since profit in ocean transportation depends upon quick cargo turnover, one of the developments of the war is likely to be the installation of an immense quantity of labor-saving machinery at ports and terminals throughout the world.

Already traveling cranes are quite as common, if not as powerful, in the modern factories of France, England, Italy, and Germany as in the United States. One of the Schneider plants has a 120-ton traveling crane. Those at the A. E. G. have already been described. In Italy light gantry cranes are used for piling lumber, being transferred from the tracks in one bay in the storage shed to the tracks running parallel in another, by an electrically operated transfer car. The steel and shipbuilding plants in Italy are especially well equipped with cranes. At one of the Ansaldo shipyards there is a 6-ton turret crane of 108-feet radius, and an 180-ton floating crane. At the Portovecchio docks of the Ilva plant there are as many as six Temperly unloading cranes. Other types of cranes found in Italy are tower cranes, locomotive cranes, overhead

cranes, bridge cranes, and cantilever cranes, besides innumerable hoists.

The type of conveyer which Italy has developed perhaps to a greater extent than any other country is the telepher, or aerial rope cable-way. (See Figure 20.) This is a natural development in a country of perpendicular mountains and

Figure 20. (a) Aerial Transport in Italy
Steel works at Piombino. Aerial line for transportation and distribution of the raw materials.

rough gorges. Alpine warfare, with its problems of transporting men and materials over an almost impossible terrain, was an added stimulus to an ingenuity developed by long experience. Perhaps the most spectacular installation of this sort is the coal cable-way which runs from the port of Savona up into the mountains to San Guiseppe—about twelve miles. The coal is unloaded from ships into bunkers by means of conveyers and elevators and the bunkers dump it into buckets

each holding a ton and a half. These buckets are drawn along the cable-way at the rate of 21 kilometers an hour and make the 12-mile trip in just about an hour. This is at a speed of 1,140 feet a minute—so much in excess of the common American practice in the mining districts—where the limit is about 1,000 feet per minute—that I was at particular pains to check

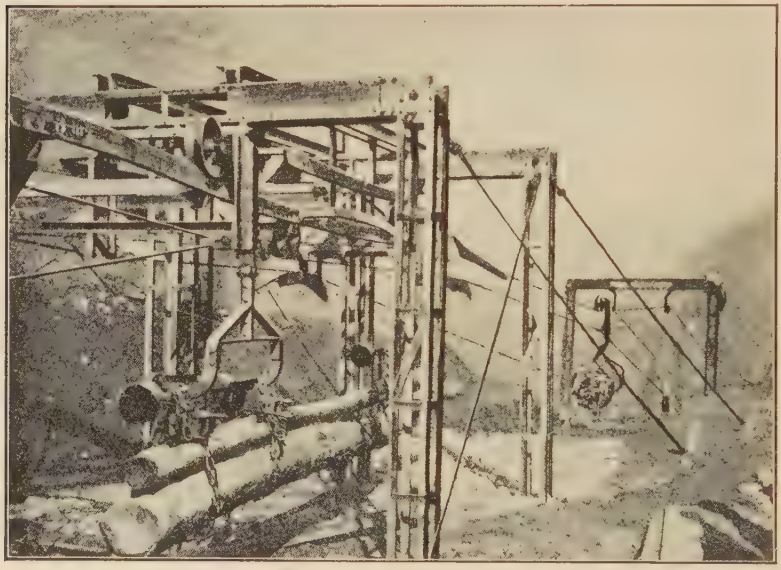

Figure 20. (b) Aerial Transport in Italy
Detachable telepher for timber transport

up the figures the day we visited the plant. Upon arrival at its destination the buckets are dumped into railroad cars or upon the ground. Telephers are used extensively in Italy for the transportation of timber from the slopes of the mountains, for carrying cement, and for the haulage of ore from the mines. They have also reached a very high development in Germany, extensive installations having taken place in the mountain regions of East Africa before the outbreak of the war.

Electric magnet cranes of various types were found in all four countries. These are used principally to load scrap and pig into Martin or similar furnaces, the usual procedure being to gather the material with the magnet and drop it into the trays which the electric charging crane thrusts into the furnace doors. At the Breda plant in Milan on the day of our visit they were gathering the scrap with a magnet attached to a

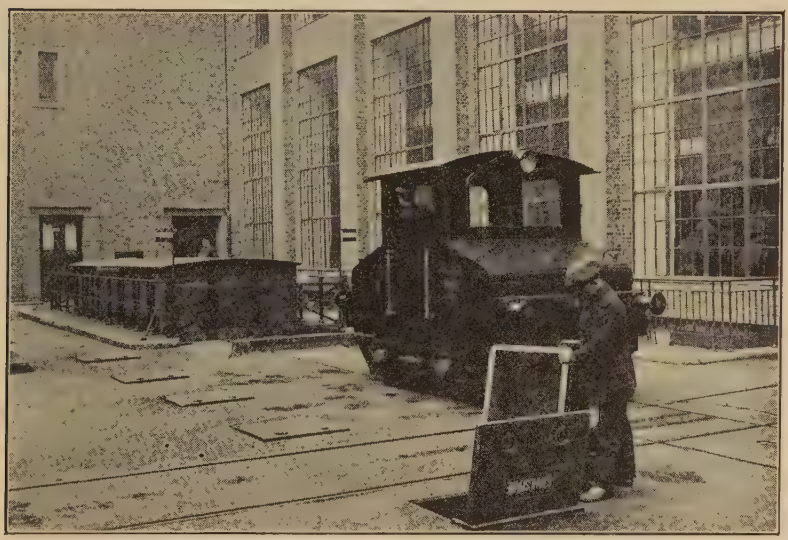

Figure 21. (a) Scrap-Handling at the A. E. G.
The cast iron cover bears the name of the particular sort of scrap for which the chute is intended.

locomotive crane, run on a track through the center of the yard. The scrap was released directly into the charging trays which rested on rails between the yard and the parallel charging crane-way. This permitted the charging crane to engage the filled trays and to whirl around direct to the furnaces which were parallel to the line of rails. In a British plant the trays were taken from the yard on flat-cars and hauled to the charging crane by means of a small locomotive.

Scrap-Handling and Portable Car-Dumping Plants

One of the most interesting mechanical installations is the scrap-handling plant of the A. E. G. The scrap is gathered up about the plant in small steel cars conveniently placed in various departments, each variety of scrap—"turnings," "nigger wool," etc.—being placed in a separate car. These cars are then hauled to the scrap plant and dumped down the proper chute, a cast iron cover bearing the name of the par-

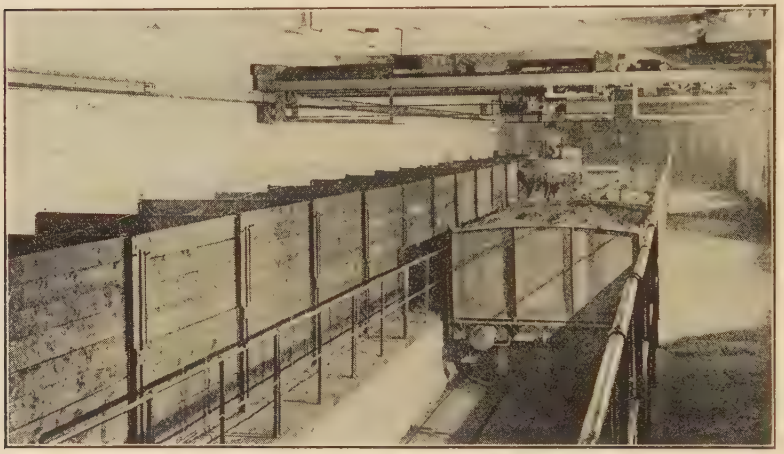

Figure 21. (b) Scrap-Handling at the A. E. G.
From the chute the scrap passes into the proper bins, from which a magnet attached to a small overhead crane later transfers it to a railroad car.

ticular sort of scrap for which the chute is intended first being lifted. (See Figure 21a.) The scrap then passes into the proper bins, from which a magnet attached to a small overhead crane later transfers it to a railroad car. (See Figure 21b.) The railroad car is then raised to the yard level by means of an elevator and hauled away. Certain sorts of scrap are baled by means of a magnet which feeds a hydraulic press. This same type of elevator is used for lowering box-cars to the level of the loading platform so that motors may

be run into the cars at platform level on small trucks. The plant is also equipped with devices for dumping railroad cars full of coal by tipping them on end, whereupon the coal passes to storage cellers, whence it is conveyed by pan-conveyers to the automatic stokers at the rate and quantity which may be required.

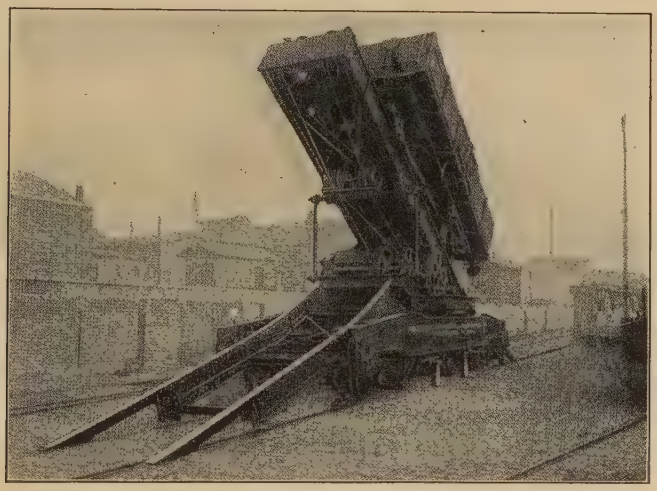

Figure 22. (a) Portable Car-Dumping Plant
General view of an Aumund tipple, older construction

A comparatively recent development in Germany is the portable car-dumping plant. (See Figures 22a and b.) This is built on a railroad truck and can be hauled to any part of the standard-gauge track and quickly set up in such a way that coal and dirt cars can be pushed up onto it and dumped at the side of the track. The method also permits building up immense piles of coal or soil by hauling the portable car-dumper upon rails laid on the pile. The rig is equipped also with grab buckets for loading from piles so that altogether it is a useful and ingenious storage device. (See Figures 22c, d, and e.)

Use of Electricity

The old European type of rolling-mill, with crowds of men rushing about in the intense heat and steam, rapidly is being replaced by the electrically operated mill where live rolls feed and receive the ingots as they pass between the rolls. I found them building electric mills of the most modern type

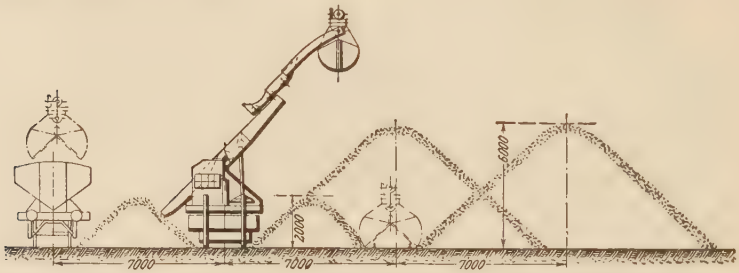

Figure 22. (b) Portable Car-Dumping Plant
Side-elevation of an Aumund tipple, latest construction

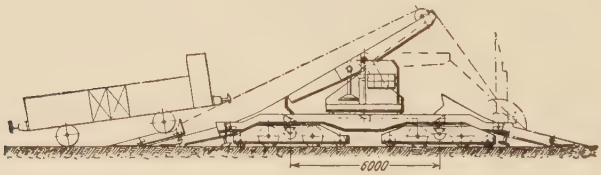

Figure 22. (c) Portable Car-Dumping Plant
Loading and off-loading by means of portable tipple upon an extensive store yard

at Le Creusot and at the Vickers plant in Sheffield. Most of the rolling-mills I saw in Italy were operated by hand, as is still the custom in most European plants of the older sort, except in Germany.

Elevating trucks for transporting materials inside the factory are in use in all the modern European factories. Electric tractors and trailers are also used extensively. Italy has been making use of the fact that her finest farm lands are close to the mountains by developing and using electric plows operated by hydro-electric power taken from a trolley.

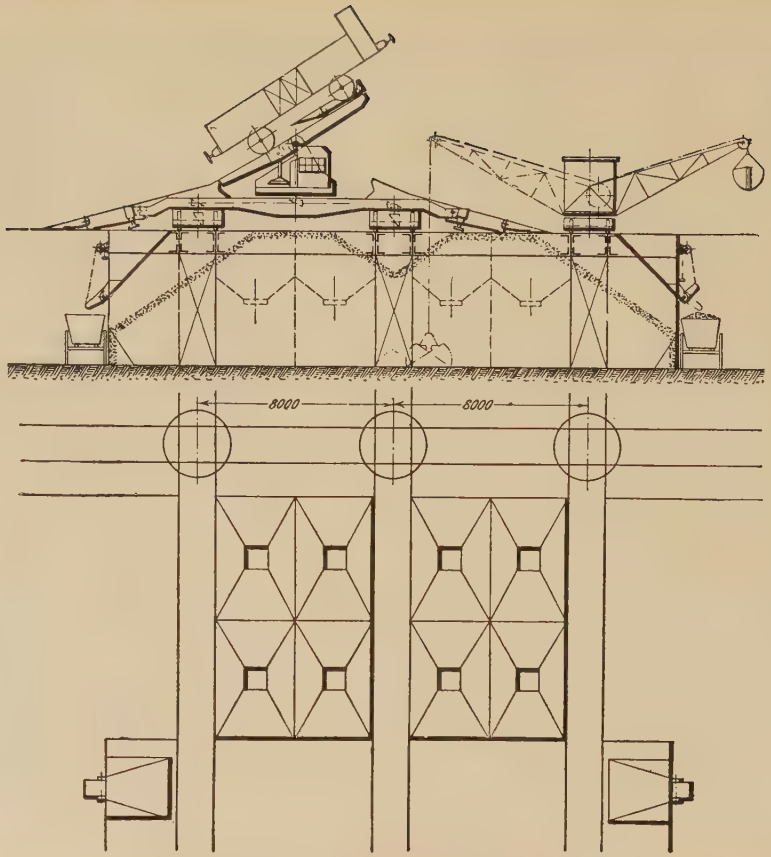

Figure 22. (d) Portable Car-Dumping Plant
Employment of tipple on elevated railways at right angles to the track

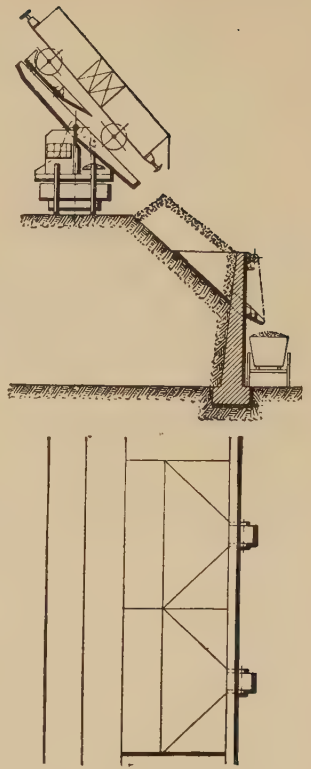

Figure 22. (e) Portable Car-Dumping Plant
Arrangement of storage places along the railway embankment

Stimulants to Use of Machines Abroad

Even though the fallacy of limited output benefiting the worker still survives in parts of Europe, the war everywhere advanced the use of the machine. Things had to be done which couldn't be done fast enough or which couldn't be done at all by hand. Germany was using machines and winning and it was a case of get fit or fail to survive. Furthermore, the use of women in industry stimulated the use of machinery and the adoption of makeshifts which would allow production to be maintained at an expenditure of less muscular effort. The flood of material and machines from America, together with experts to demonstrate their use, possessed the force of education by example as well as by precept.

To illustrate this point the director of a certain Sheffield steel plant told me that he had bought an American vacuum cleaner a short time before. When his wife suggested to the maid that she make use of it, the girl gave notice. She said she "knew her place"—which meant her rights—and demanded the broom and dust pan which was her dower from generations of self-respecting slaveys. Her mistress finally gave the vacuum cleaner to her little girl to play with and the child amused herself by licking up the dirt with it in two-thirds of the room whenever the slavey enveloped herself in a cloud of dust in the time-honored manner in the other third. Finally this was too much for the self-respect of the proud representative of the "serving clarss" and she informed her mistress that she might be induced to use the vacuum cleaner if properly approached. After she had begged sufficiently hard to establish the right of existence also of the despised "upper class," her mistress finally gave in.

This is typical of what has been going on all over Europe. The old guard die hard. They will tell you how they had to teach America how to make guns. They will rise on their hind legs and paw the air whenever American methods or

American progressiveness is mentioned, but American machines are in almost every factory and port of the allies. The manufacturing nations must meet competition, make war, or go under. Modern warfare isn't a profitable game—for anybody—we have all found that out. Europe also awoke to the fact that she was falling behind in the use of machinery. She discovered that America had learned to pay higher wages and still produce enough more per man so that it was possible to undersell Europe. Argument and assertion were useless. Demonstrations of what American machines could do were taking place all over Europe. The lesson is now pretty well learned. With the return to normal, Europe rebuilt and equipped with American machine tools, will be an antagonist for world markets worthy of the best machines our ingenuity can devise.

Durability of European Machines

Practically all motors made abroad are set up, operated for some hours, and then completely disassembled. After the necessary corrections are made the engine is again built up and tested. In Paris the wonderfully designed motor-buses, after a certain period of use, are completely disassembled, every part is examined, and worn parts are discarded. The usable parts then become part of what is practically a new car—every part of which is sound. They figure this system is much better than our own of repairing one part after another as it breaks down, which makes a trip in a car more than three or four years old a gamble as to whether you will come home in the car or on foot. There is one bicycle company in England which even gives a perpetual guaranty, replacing not only defective parts but those which wear. American manufacturers who expect to profit by the efficiency of American machine tools must remember that Europe is used to figuring the cost per year and that a machine which cost $2,000 and

lasts eight years is only half as expensive as the one which costs $1,000 and only lasts two. Americans—with all their love of new paint and the latest style—are beginning to realize this same thing, as the avoidance of certain types of cars shows. *Cost per year to the consumer is what ultimately determines the popularity of a product.*

CHAPTER VIII

STANDARDIZATION

Management Engineering in Early Days

Less than two hundred years ago Benjamin Franklin, after long and anxious consideration of so momentous a step, made the journey from New York to Philadelphia. He traveled for more than seven days before he reached his new home. Today you can board the five o'clock train from New York any afternoon and find the club car filled with men in dinner jackets—making the same journey—simply to dine, spend the evening with friends in Philadelphia, and return home the same night. In Franklin's time the control of an industrial organization was a comparatively simple affair. At most the organization consisted of a dozen men—"the help"—all working together with the master. They knew each other intimately and their families knew each other. The master and an apprentice or two brought in the raw material—perhaps on their backs, in the evening—each man in the establishment knew from long experience what he was to do, and they all went at it together.

Under the circumstances it was a simple matter to plan and lay out the work. The master could think out such details of the next day's task as were necessary between the time he brought home the raw material and the few minutes he set aside each evening for entering his cash income and outgo for the day in the primitive home-ruled account book which comprised his bookkeeping in its entirety. Employment management consisted of hiring a new man every two or three years and welfare work was confined to the nursing of the sick, the women, including the wife of the master, taking

turn about. While at that time industrial administration was in an elementary state, the principles were identical with those which exist today, for human nature, basic materials, and terrestrial conditions in the domain of William Penn before the American Revolution and in the Pennsylvania of today—steel and coal center of the world—remain much the same.

Franklin as an Industrial Engineer

Benjamin Franklin himself, to all intents and purposes, was an industrial engineer. He applied the principles of scientific management to many industrial activities with which his work brought him in contact. He even worked out thirteen principles of personal efficiency and marked himself daily upon the attainment of these standards. He made use of the scientific method in his approach to the problems of the day, instead of "learning by experience" and accepting the existent procedure—good, bad, and indifferent—as holy writ, never to be questioned. Upon one of his journeys to the forts on the frontier he time-studied two men cutting down pine trees and found that a 14-inch tree required six minutes to fell. He studied street-lamps and evolved a standard—with four panes and holes in the bottom for ventilation. He standardized street-cleaning—"piling the dust in the center so that the rain, as it fell, would wash it away in the gutters." He standardized mud-hauling carts with "the bodies of the carts, not placed high upon wheels, but low upon sliders, with a lattice bottom, which being covered with straw will retain the mud thrown into it, and permit the water to drain from it, whereby it will become much lighter, water making the greatest part of the weight—these bodies of carts to be placed at convenient distances and the mud brought to them in wheelbarrows, they remaining where placed till the mud is drained and then horses brought to draw them away." He recommended "a set of experiments, first to determine the most proper form of the

hull for swift sailings[1] (of ships), next the best dimensions and properest place for the masts, then the form and quantity of sails and their position as the wind may be, and lastly the disposition of the lading. This is an age of experiments," he commented, "and I think a set accurately made and combined would be of great use." Franklin was not content with current opinion. Before reaching a decision he demanded the facts. What more can the searcher after truth in the laboratory or the administrator of the great industrial enterprise demand today—except the power to put it over—once the right course is determined.

Management Under Conditions of Today

Even within the memory of our own veterans of industry the average factory was a small affair in which the owner worked with his men. Within the decade the manufacturing establishments of one of the busiest New England states averaged less than thirty employees each. The reason for existence of most that is novel in our modern industrial organization—in executive control or in specialization—is to be found in the increase in size of our industrial units. Neither Benjamin Franklin with his three-man printing-shop nor W. L. Douglas when he operated his first factory with six "hands" needed double-entry bookkeeping, with auditors and comptrollers; employment management, with interviewers and directors of personnel; line organization, with foremen, superintendents, and managers; staff organization, with specialists and research men; or scientific management with time-study experts and industrial engineers.

But conditions have changed. Many of our vast corporations are controlled from offices thousands of miles from the

[1]It is interesting to note that this suggestion has recently been made use of by the British government, which has worked out a tank for testing large models of ships, whose construction is contemplated, under the various weather conditions. These experiments have resulted in radical changes in existing notions of ship construction and in material economy of power.

seat of their activities and are owned by some thousands of stockholders located all over the world, who are interested only in profits—large—frequent—and permanent. Such conditions are responsible for the creation of a machinery and a personnel which never existed when the owner worked at the same bench with his men. An exact organization with standard executive officers performing well-defined duties is just as natural an outgrowth of the industrial army which develops with the growth of one of our great corporations, as a standard military organization—generals, colonels, captains, and the like—is the outgrowth of the development from the Stone Age raiding party of a dozen men led by the chieftain, to the European armies which existed when the Great War ended.

The new science of administration is not a revolutionary cure-all, devised by smart alecks with more theories than common sense, as some of the veterans of the small shop seem to think. It is a natural evolution, born of the giant corporation, the purpose of which is to maintain in operation under changed conditions the principles of good management which centuries of industry have demonstrated are necessary if business ventures are to prove successful.

Standardized materials and standardized industrial accessories—from tools to buildings—are also the natural result of industrial evolution. It may have been economical for each Paleolithic warrior to select his own flint and to cut his own arrow shaft—a mistake in judgment on his part meant only the loss of his own life. Today it would be neither economical nor safe for each soldier in an army of 5,000,000 to build his own weapons nor for each workman to fashion steel rails or ship-plates—upon whose perfection the lives of thousands depend—as his individual fancy directed. Industry has become too complicated for one man to understand all of even a single branch. It is a case for specialists and for research laboratories.

Meaning of "Standardization"

The term "standardization" as applied to industry pertains to material, to labor, or to either or both of these elements combined with accessories, such as tools and the like, which in effect results in the development of standard methods of procedure involving all three elements. These may be tabulated as:

1. Standardized materials
2. Standardized labor
3. Standardized accessories
4. Standardized procedure

1. Standardized Materials

Under "standardized materials" we have such things as laboratory-tested steels, analyzed coals, clays, cement materials—everything in fact whose exact composition must be known in order that building or manufacture may be so conducted that the final result may be predicted before the work is begun. Originally such tests were principally confined to a determination of the composition of raw materials. Of late the tendency has been more and more toward a determination of the physical qualities also. It has been found that a chemical analysis of a steel is worth more when the tensile strength or hardness is known also, and that it is often more desirable to know what a fire-brick will do under load conditions, when laid up in the wall of a steel furnace and heated to 2,500 degrees, than it is to know exactly how much silica it contains.

The extra time required to machine unusually hard castings is often sufficient to upset the manufacturing program for the day, to say nothing of established piece rates. Castings that develop defects in the last process of manufacture after an expenditure of labor through previous departments not only cause the loss of such labor but often upset the work planned in the rest of the shop and disappoint—perhaps alien-

ate and lose—the customer who expects shipment on a certain date. Improperly cured lumber may result in heavy manufacturing losses. In the continuous-production type of factory—cement plants, paper and flour mills, brick plants, and the like—a defect in a raw material cast into the original batch may send the whole output over the dump, as surely as salt mistaken for sugar will ruin good flour, butter, and eggs—to say nothing of carefully expended labor—when the housewife makes a similar error.

2. Standardized Labor

The "standardization of labor" follows two main lines:

(a) The determination of the amount of work required to perform a given operation, with standard tools, etc., upon standard materials. So far standardization of this kind has been confined to determining the amount of time required for the average worker to perform a given task[2] rather than the expenditure of foot-pounds of energy per hour.

(b) The determination of just what qualities, training, and affiliations shall fit a man to perform certain work. The standpoints from which this phase of labor standardization has been attacked are as remote from each other as the poles of the earth. The most important are as follows:

(1) The determination of the qualities which fit the man to the job range all the way from the German psycho-technical tests, the American army tests, psycho-analysis and character analysis, to phrenology and soothsaying.

(2) The training of workmen concerns the direction of apprenticeship courses, of vestibule schools for training new arrivals at the plant, of vocational training schools, of grade schools, and of universities. The future of industry depends upon this training.

(3) The determination of just what affiliations shall fit a

[2]See chapter on rate-setting for further elaboration.

man to do a certain piece of work is the concern of the trade unions who have been giving considerable attention to the matter, not so much for the purpose of increasing the efficiency of industry as to protect themselves against the use of unskilled labor at low wages on work that they feel they are entitled to. Some of the rulings of a certain board of adjustment illustrate the lengths to which this may be carried.

Formerly an exhaust nozzle tip (the thing that makes a locomotive puff) was changed by any machinist or boiler-maker whom the foreman picked up about the roundhouse and assigned to the job. This man unbolted the door in the front of the boiler, uncovered the manhole in the spark-arresting netting, disconnected the blower pipe, removed the nozzle, welded the prongs, replaced the nozzle tip, connected the blower pipe, replaced the manhole cover, and closed the smoke-box door—which finished the job.

Now, under the rules, the gang foreman notifies each of four craftsmen individually of the operations required of him. The boiler-maker with his helper opens the smoke-box door and removes the manhole cover in the netting. The pipe-fitter and his helper disconnect the blower pipe. The machinist and his helper remove the nozzle. The acetylene-welder and his helper weld the prongs. Then the machinist and his helper replace the tip, and the pipe-fitter and his helper connect the blower pipe, and, finally and lastly, the boiler-maker and his helper close the smoke-box door.

Imagine this solemn procession to and from the ailing engine, the time wasted on the way, and the waiting for the previous pair to finish. They carried the same system to excess in India—where eight servants are required to do the work of two—the man who cleans the house cannot work in the garden or the man who cooks cannot open the door for guests. It is called the "caste system" and it made native India what she is today—a land of poverty, ignorance, and

starvation. The future of industrial America will depend upon our retention of the real democracy of our forefathers, upon the avoidance of caste, of class distinction and of class hatred, and of all effort to do by legislation that which can be done only by hard work. The only way to have things is to produce them. Intelligent trade unionists realize this fact and co-operate to that end.

3. Standardized Accessories

"Standardized accessories" cover an almost unlimited range. Under this head would come:

(a) Standardization of Machines. Standardized machines may be defined as machines capable of making a maximum cut, with standardized tools[3] of standardized steel on standardized materials without developing structural weaknesses which delay output or result in excessive charges for maintenance. Under the head of "standardization of machines" is included also the reduction of all machines in a factory to a common denominator as regards machine accessories, so that within reasonable ranges all tool-holding devices, jigs, fixtures, etc., are interchangeable—which saves investment in such devices and in tools also. It furthermore includes the equipment of machines to cover a wider range of work, so that work may be done on any one of several machines instead of having to wait for a particular machine, with attendant congestion and delay.

(b) The standardization of transmission mediums, such as belting—the determination of the width, thickness, material, tension, drive length, etc., that will give the best results under given conditions. This results not only in less breakdowns—with attendant delay, loss of output, and repair expense—but in a lower belt cost per year since the life of an improperly fitted belt is very short.

[3]See Taylor's "Art of Cutting Metals," etc.

(c) The standardization of oils, greases, and lubricants of all sorts and their containers.

(d) The standardization of trucks, trailers, conveyers, and all transportation machinery so that parts are, in so far as possible, interchangeable.

(e) The standardization of drawings, blue-prints, gauges, printed forms, symbols for marking tools and machines and for use in clerical work (mnemonic symbols), and all similar aids to production.

4. Standardized Procedure

"Standardized procedure" is a combination of all that has gone before. It may be developed in the form of blue-printed instruction cards such as fill the library at the Tabor Manufacturing Company and record in detail the procedure for every piece of work performed for years—the elemental operations, their sequence, and the time required for each of them. Having this information available at a moment's notice prevents endless rehashing and argument as to methods of procedure that in so many plants have already been settled a hundred times, but concerning which no one remembers anything definite. Such instruction cards preserve a record also of the laboratory experiment—a piece of research work too expensive to do before every job but which pays for itself hundreds of times over if ably and scientifically conducted at first. The instruction card furthermore in the shortest possible time educates the workman to the best method of doing the job as quickly as possible.

Standard procedure is usually developed by the industrial engineering department of an organization—whether it be a bank,[4] a factory or a commercial concern—acting in a staff capacity to the management. Once the procedure is approved

[4]The larger banks such as the federal reserve bank, the National City Bank of New York, etc., have maintained such departments for years.

by the management it is issued over the signature of the chief executive in the form of written "standard practice instructions," to all executives whose departments it affects, superseding all previous orders in much the same manner in which new laws passed by a government supersede and void such portions of previous laws as are in conflict with the new legislation. In this way, in loose-leaf binders furnished each executive, is built up a written code covering the method of doing business, which previous experience, research, and conference have shown is productive of the best results. Inasmuch as the industrial engineering department—it is assumed—has consulted every person concerned, has studied existing procedure in detail, and has determined in just what way the new ruling will affect all concerned, before making its recommendation, the result is a joint affair and the confusion that often results from autocratic and ill-considered orders is avoided. Furthermore the time which the chief executive would expend under the usual method of procedure in interviewing various department heads as to details, in order to make sure that he has all the facts, is released for more important work. And finally, since the law of the organization is in writing, there is no excuse for any executive or any workman being unfamiliar with his duties.

In working out standard practice instructions it is, of course, necessary to exercise discrimination. Standard practice covering the detail as to just how a man should walk to his offices each morning, where he should place each foot, the special motions he should adopt in case of rain, hail, snow, and the like, would be as absurd as David Parry's[5] account of the Socialistic Empire, in which inspectors forced everyone to laugh every twenty minutes for the good of their health. Common sense is as necessary in working out standard practice as in any other business activity.

[5]Parry, David M., The Scarlet Empire.

Use of Terms to Denote Mass Production

The term "standardized" is also used extensively abroad to describe the manufacture in immense quantities of one type of product—mass production in other words. The manufacture of Ford automobiles would be referred to as "the manufacture of standardized motor cars," for instance. What is usually meant, however, is the Continuous Production System of manufacture as against the Job Production System—the substitution of the wholesale manufacture of ready-made clothes by thousands for individual custom tailoring. It is what has taken place in most of our automobile plants. Formerly in a particular plant whose growth I have watched a certain number of cars of each sort were assigned to the plant each month and each part was very carefully planned and dispatched from one machine to another in order that a machine might be used first for one sort of work and then set up for something of an entirely different nature. This elaborate planning mechanism has been supplanted by a standing order for so many parts per day, each manufactured on a machine which specialized on this part alone, and all following by regular channels to the various assembly points where they united again and again until finally, in the form of the finished cars, the stream flowed out of the plant.

Standard Unit Assembly

This requires what is known as "standard unit assembly." Under this system, instead of assembling the whole machine, piece by piece, the various unit parts are assembled first into groups, as it were, and then these groups are later united to form larger groups or the finished machine. Thus the engine of a motor-car will be assembled complete, ready to drop into the car; the rear axle will be similarly assembled; and so forth. The advantages of standard unit assembly are:

1. The work of assembly can be more accurately controlled;

detailed time study is made possible through the reduction of the process from a complicated operation to a number of simple operations which are more easily handled.

2. The interchange of assembled units from one machine to another is made possible, thus increasing the flexibility of manufacture.

3. Quick delivery is made possible through having a great deal of the work completed in the stock.

4. Storage of more weight in less room is possible than is the case when completed machines are stored. Machines may be shipped in the "knocked down" state and assembled at the point of use.

5. The operation of the shop on stock work becomes possible. In this way less money is tied up than is the case where parts are made which are good only for a single machine which may not be ordered in years.

6. The development of specialists is favored resulting in reducing the cost and increasing the quality.

7. Inspection is simplified and thereby cheapened.

Progressive Machining

Progressive Machining is another development of the standardization attendant upon the metamorphosis from the job production into the continuous production shop. The old machine-shop, working largely on special orders, grouped its machines by kinds. All the drill presses stood together, all the milling machines were in one place, and all the lathes occupied a space by themselves. This was all right when there were only two or three of each kind of machine in a plant. As plants grew, however, and contained hundreds of each kind of machine, separate departments—often located a good many feet apart—were necessary. This meant that when a number of operations were necessary on a piece it had to be carried from one department to another—perhaps several times over

the same ground, with attendant trucking expense. It also meant delay, in tracing the piece when lost; congestion, when too many pieces arrived all at once in a department; loafing, when not enough pieces arrived to keep the working force busy; unnecessary stock-chasing expense; and many other difficulties, which added to the cost of production.

To get away from this sort of thing progressive machining is being substituted wherever possible. As soon as a part can be standardized—and that is often possible even in a plant working principally on special orders—the number of machines required to perform the various operations, and the length of time each machine must be operated may be determined from the amount of work to be done. Thus, if the first operation were drilling and a hundred pieces required an hour to go through a single drill press, the second operation—punching—which required half an hour for the hundred pieces, and the third—slotting—which required two hours per hundred, the number and sort of machines would be determined by the output of the fastest and enough of the others would be set up in series to keep the fastest one busy and the output of the department constant, thus:

Operation	Time per 100	Pieces per Hour	No. Machines Required	Output per Hour
1. Drill	1 hr.	100	2	200
2. Punch	½ hr.	200	1	200
3. Slot	2 hr.	50	4	200

This arrangement turns the department into a continuous production shop, which operates like a coffee-mill or a sausage machine, turning out the finished product at one end as fast as the raw material is fed into the other. In order to work successfully, standard times for each operation must be determined, standard materials and tools must be provided, and breakdowns of individual machines guarded against by making repairs before the breakdowns occur. Otherwise one group of

machines will delay another and the continuity of operation will be interrupted.

Progressive Assembly

The same principle is applicable to assembly and similar work and has been employed extensively in connection with chain, belt, and car assembly and fabrication. This Progres-

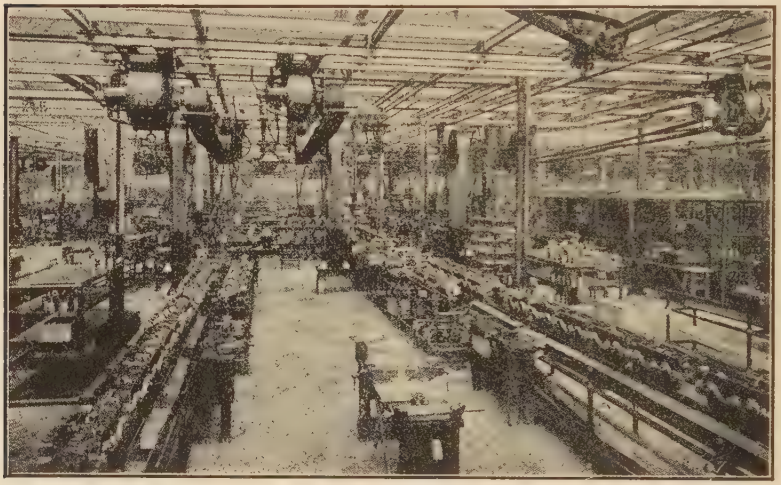

Figure 23. (a) Progressive Manufacture in America
Motor assembly

sive Assembly differs from ordinary manufacturing methods in that each unit under fabrication is moved at a fixed speed by mechanical means past given points where particular operations must be performed. The underlying labor principle is an old one and in an elementary way has been in use for a very long time in bucket fire brigades, loading ships, and similar manual operations, where speed was essential and could be best secured by arranging the workers in lines, so that the weakening of a single unit would be at once observable in the stoppage of the entire flow. Later it was used in brickmaking and in

similar continuous production systems of machine-manufacture, where the failure of the workmen to remove the finished or semifinished product from the machines—whose speed and whose supply of raw material were fixed—resulted in instant and evident congestion. In a way, it is a method of forcing the work onto the men by mechanical means, and unless judgment and humanity are exercised in regulating the speed and

Figure 23. (b) Progressive Manufacture in America
Final assembly

in assigning the operators—which can be done fairly only by the use of the stop-watch—is not only as harsh as the treadmill but results in some men on the line loafing while others are overworked.[6]

The chain assembly in automobile plants—first given publicity in connection with the Ford plant—is perhaps the most spectacular application of progressive assembly. (See Figures 23a and b.) There in the final assembly division the units already individually assembled elsewhere, under the standard

[6]See chapter on rate-setting.

unit assembly system, are combined to make the complete car. At the start of the chain conveyer in this division a front-axle unit, a rear-axle unit, and a frame unit are combined and the chain conveyer, moving at a fixed speed, engages them and thereafter regulates the rapidity of their progress. The gasoline tank, containing one gallon of gasoline, is added, as are the hand-brake control lever, gasoline feed pipe, fenders, motor, dash unit (including steering-gear coil, horn, and wiring), exhaust pipe, muffler, wheels with tires inflated to proper pressure, and radiator. The engine is then started, the body is swung into position and fastened, and the car, now complete, moves away under its own power.

Before this system was installed 1,100 employees were required in the engine unit assembly division to build 1,000 motor engines a day. After it was installed 1,400 men built 3,000. The pressure under which the men work is terrific, but short hours and education in hygienic methods of living make the crowd that pours from the doors of the Ford plant each evening, as I can attest from personal observation, as healthy and happy an army as I have ever seen issue from a factory anywhere in the world.

In so gigantic a case of standardization as this, in a factory turning out over 1,225,000 cars a year and employing over 50,000 men, for the most part engaged in progressive machining or in progressive assembly, where each unit assembly chain conveyer must feed its quota of parts into the main stream of the final assembly, where congestion and chaos would follow imperfect synchronization, the amount of standardization of materials, tools, accessories, and labor is almost inconceivable. The first cost has been terrific but the result is the production of a dependable automobile at a cost which is the despair of competitors throughout the world.

The principle of progressive assembly and fabrication[7] is

[7]Together sometimes called "progressive manufacturing."

by no means confined to the use of chain conveyers. Besides the regulation of the speed of production by regulating the speed of the machine, there are numerous intermediate applications, such as the use of conveyer belts, along which operators perform small assembly tasks or fill packages, the use of circular belts and tables on similar jobs, the use of conveyers for casting automobile engines, and the like. The guiding principle is a power-regulated rate of production.

Progressive assembly of a sort is also in use in the plant through which the product flows from department to department over a regular course. In this case, however, the speed of the stream is regulated by the volume of flow at its narrowest point. When something goes wrong in a department the whole stream is dammed up and there is a famine below and a flood area above the point of congestion.

Summary

To recapitulate, the term "standardization," as applied to modern industry, covers:

1. Materials—laboratory examination insuring a constant quality.
2. Labor—the determination of:
   - (a) The amount required for each job—determined by analytical time study.
   - (b) The quality required for each job—determined:
     - (1) By tests of experience and potential ability.
     - (2) By training—developing potential ability.
     - (3) In accordance with affiliation, in trade unions, etc.
3. Accessories—conditions surrounding the work:
   - (a) Machines.
   - (b) Transmission.

Figure 24. Progressive Manufacture at the A. E. G.

(c) Lubricants.
(d) Transport.
(e) Miscellaneous.

4. Procedure:
   (a) Standard instructions.
   (b) Progressive manufacturing:
      (1) Standard unit assembly.
      (2) Progressive machining.
      (3) Progressive assembly.

Standardization of Materials Abroad

Standardized materials have become necessary to the plants using steel and other materials whose quality is essential. In consequence the more modern plants abroad are equipped with laboratories, just as they are in America. The laboratories of the Pennsylvania Railroad Company, of the American Rolling Mill Company, the General Electric Company, the Ford Company, and the Eastman Kodak Company, find their counterparts in those of the Krupps, the A. E. G., and the Loewe companies in Germany; of Hadfields, the Metropolitan-Vickers, the Brown-Firth, and Lever companies in England; of the Ansaldo, Fiat, S. I. P. E., Biak, Pirelli, and certain food product companies in Italy; and at the Schneider, Berliet, and Renault plants in France.

In England a Department of Scientific and Industrial Research has been established by the government, under treasury grant. The new electrical syndicate in Italy voted a million lire for research work. At one German plant I visited all raw materials were examined: metals were given chemical and physical tests; castings were tested for hardness; and all coal, coke, oil, and other supplies were analyzed before the railroad cars were unloaded. This laboratory did work also for smaller plants in the vicinity that were not equipped with laboratories. Pyrometers and sometimes pyrometrical cones

are used for metallurgical work and for heat-treating in most of the plants visited.

Private Research Departments in England

At a very large and modern plant in Manchester all standardization work is under the direction of a research department which has charge not only of what is commonly known as "research work" and the tests of raw materials but takes care of the work usually done by American industrial engineering departments. This department analyzes methods of manufacture; plans the progress of work through the plant; sets delivery dates on new work; investigates difficulties arising in the manufacturing organization; controls technical processes in manufacture; develops new tools, appliances, and methods; improves and standardizes those existing; and develops methods for the treatment of factory waste and the utilization of by-products. It furthermore engages in "physiological and psychological investigations relating to vocational selection and for determining the most efficient means of employing human services." It is also in charge of educational and welfare work, and performs various other staff duties—all of which can economically and logically be grouped under a single head.

At another plant in England, run strictly according to the best principles of scientific management, there are three research departments. One is under the purchasing and stores department and in its chemical, physical, and heat-treating laboratories determines the suitability of all raw materials and supplies as they are received. Another is under the direction of the factory manager and in it, new machines are tried out and tests are made to determine their capabilities, limitations, and most effective use. The possession of this laboratory also enables the factory manager to work out solutions to factory problems and to originate new processes. The third laboratory

is attached to the sales department and in it is done research work designed to increase the sales field of the company. New ideas are tried out and new products are originated.

England is well aware of the value of research, Germany having furnished a striking example of the value of the industrial laboratory, and an effort is being made to tie up the laboratories of the technical schools and universities with industry and with the government laboratories. Especial attention is being given to the elimination of unnecessary fatigue in industry both by the government and in the universities—by Dr. A. F. Stanley Kent, head of the Department of Industrial Engineering, College of Technology, Manchester, by Drs. Myers and Muscio at Cambridge, and by certain others who realize that more efficient production means more output with less wear and tear upon the producer.

Standardization of Accessories in Europe

Labor standardization will be discussed in the chapters on rate-setting, personnel,[8] and education. The standardization of accessories has been to some extent discussed in the chapter on machines. High-speed steel is generally used abroad, as are American machine tools. Tool-grinding is done in separate departments according to established standards at certain of the newer French plants and at the German plants. The standardization of transmission is being solved quite largely by the introduction of the direct electric drive in most of the new plants of Europe. In Germany profusely illustrated printed instructions are issued, covering methods of belt-lacing and the like. At Le Creusot all tools are not only standardized but special tests are made of all tool steel and castings used in order to satisfy the men that they can accomplish the standard tasks in the time set. In these tests a simple tool of stand-

[8]Inasmuch as the quality of the labor is affected by the health and happiness of the workman all welfare work naturally enters here.

ard shape is made of each lot of tool steel and a test piece of a certain size and shape is set in the machine, where the tool is brought in contact with it at a given pressure for a given length of time. If the test piece is not reduced to a certain size in that time the tool steel is rejected. This is a test which all the workmen can see and understand and when it is over they know they are working under standardized conditions as regards tools and materials and that failure to attain standard output is due to something else. This system has been in use over twenty-six years.

Standardized Accessories in Germany

Germany is really the home of standardized accessories. They carry this passion for standardization and orderliness to an extreme impossible elsewhere. On Sunday, if the day be hot, you will see many venerable gentlemen pottering about in the Thiergarten with their hats hung on hooks attached to the front of their vests. The fittings in the compartments of the sleeping-cars are a marvel of ingenuity from the windproof ash trays to the bottle-holders which prevent loss of valuable beverage in case of a sudden stop. The rooms in the Adlon Hotel in Berlin are more scientifically designed for comfort, use, beauty, and service than anything we have in America: built-in wardrobes that really hold your clothes; double doors to keep the room quiet; curtains that shut out the light but admit the air; a desk that is really serviceable; a couch that is comfortable; the latest plumbing, mirrors, and lights where you can use them to the best advantage; a waiter in your room for your order one minute after you ring the bell and breakfast six minutes later; phone attendants and porters who will act as interpreters. Moreover, a universal courtesy prevails—in spite of the fact that tips are forbidden—that is just as much an asset as the marble lobby or the garden with its fountain, its gay umbrellas, and its flowers.

Figure 25. Standardized Fire Station

In German factories you will find standardized fire stations —a big red F painted on the wall in a black circle where all may see. Below is an axe, a box of sand, two pails of water, a small chemical engine, a general alarm signal, and printed instructions. (See Figure 25.) Near all the traveling cranes you will find a metal stand equipped with hooks. On each hook is a rope of standard length and thickness. There are printed instructions—profusely illustrated—showing just how

knots should be tied and which rope should be used for each purpose.

Out in the yard you will find all trackage and all turntables standardized. Little booklets are issued showing just how the track and turntables must be operated in the interest of safety and efficiency. Standard methods of setting up machines, in which the comfort of the workers is made a major factor, have been developed, and illustrated booklets record the standard for the benefit of those who will make future installations.

Standard instructions as to the best and safest method of conducting various industrial operations are issued to workers in printed form by certain of the larger companies in Germany. These are more in the form of general instructions as to how to operate a certain machine or to do certain work—often with the accent on the *verboten*—than a detailed list of unit operations in sequence with standard times attached—which is what we mean by an instruction card in America.

Standardized Accessories in France

In France instruction cards have reached their highest development. Those at the Schneider plants I found to be quite the equal of anything we have developed in this country. Such cards have been in use in the shipyards at St. Nazaire for more than five years and are in use at Chlon and at various other industrial plants. At Le Creusot there are over 100,000 cards on file covering in detail the operations required to build a locomotive—machining, steamhammer work, heat-treating, forging, etc. The Paris motor-omnibus plant has had instruction cards in use for years.

The analytical French mind seems naturally attracted to time study and the recording of results for future use. Every new machine which enters the French plants which have definitely adopted scientific management is carefully studied and

a reference book is compiled showing of what it is capable and how it should be operated. All this information, secured both from the manufacturers of the machine, by test, and by scientifically conducted experiment, is carefully preserved in a library for future use. While the preparation of this book of instructions may cost something, the expense is nothing as compared with the cost of performing the same experiment time after time in the various shops and of operating the machine below capacity for years, simply because its capacity has not been determined.

One of the most interesting developments of standard instructions has taken place in connection with the Gobelin tapestry works in Paris—a state-owned plant which began operation in 1662. The tapestries, each specimen of which is worth thousands of dollars, are woven in accordance with designs by famous artists. In carrying out the weaving the designs are analyzed and written instructions prepared showing just how many stitches of each color are to be taken to reproduce the picture. It is a combination of co-operation between artist, man of science, and workman which is unique.

In England, in spite of certain notable exceptions, very little standardization work of this sort has been done, partly on account of the natural individualism of the British mind and partly because of the attitude of suspicion on the part of both trade unionists and the older type of employer toward innovations. Some of the Italian plants have what they call instruction cards, but those I saw were extremely elementary.

Progressive Machining and Assembly Abroad

Progressive machining is as yet fairly rare in Europe. In France they are doing it in the locomotive plant at Le Creusot and at the Berliet plant near Lyon. Mass production of shells taught them the lesson during the war and the grouping of machines in such a way as to turn the job production shop

into a series of continuous production shops is under way. Several plants have adopted the plan in England and it is in use in Germany.

Progressive assembly, with the chain conveyer, has been introduced into several British plants in much the same form as in some of the Detroit automobile plants. They were just starting such an installation in one of the French motor plants at the time of my visit.

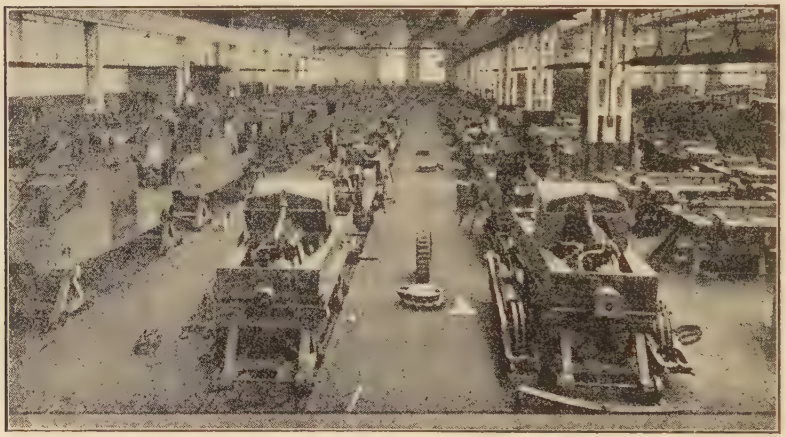

Figure 26. Progressive Assembly in a French Motor Plant

At another plant, however, while they thought they had this system, progress was actually determined by the sweet will of the workmen who pushed the cars along on their own wheels at any rate they pleased. Much the same system was in use in Germany—the work, since it is done as it moves on cars, might be called "progressive assembly" but the speed of progression was regulated by means other than mechanical.

At one German plant certain machines were so arranged as to regulate the work speed. One, I remember particularly, was a chain conveyer bearing armatures which had to be painted before they reached a certain spot. A gluing machine

operated in a British paper-box factory might have been operated on this principle. The machine was set up at the head of a rubber conveyer belt about 50 feet long which bore the box parts of various sorts, wet with glue, to each of the eight or ten girls on each side, working at tables set at right angles to the belt. This arrangement placed the speed of the work to some extent in the hands of the woman operating the gluing machine who, with all the workers in sight, could feed any particular girl parts as fast as she thought she should take them.

At another English plant the work was progressive from department to department, but, although stores of assembled parts—unit assembly—were present where needed, the rate of progress from department depended upon the weakest department, just as the speed with which water runs out of a bottle depends upon the size of the neck of the bottle.

Advantages of Standardization

Standardization is more feared by the loose thinker whose industrial experience is confined to a perusal of the radical press than almost any other phase of industry. "What!" he screams, "Are you going to murder personal initiative and reduce men to the dead level of machines by prescribing their every action?" A vice is a virtue carried to excess. Standardization applied with common sense is no more a curtailment of personal freedom than are laws against murder, theft, and assault. Standardization is education, it is insurance against accident, and it eliminates unnecessary fatigue. It stimulates initiative and research just as the record of what has been discovered in chemistry and of how to reproduce each experiment step by step, has stimulated research in chemistry. You certainly wouldn't burn all recorded scientific research in order to enable the coming generation to exercise their initiative.

The study of what has gone before combined with the

systematic research of an Edison is what makes for progress—not the haphazard dreams of a crank inventor. What has been standardized remains standard only until a better way is found. Reduction of standards to writing insures the performance of the work in the one best way known. When a better way is found the law is amended. Meantime its codification makes for order, co-operation, and safety. Suppose during the Great War every operator of a big gun had been allowed to shoot when and where he pleased. Individualism instead of co-operation is just as dangerous in an industrial army.

It has been said that the greatest obstacle to the progress of the human race has been that each generation must learn again, by bitter experience, the lessons its fathers have already learned. Each generation must learn the effect of dissipation. Each generation must have its war. Each generation must make the same political mistakes. What is true in life has been true in industry. The nation or the industry which conducts intelligent systematic research into all the factors of its activity, which records and disseminates the results of such research and which is so organized as to insure performance in accordance with such facts—until something better is discovered—is not dehumanized nor rendered mechanical. It simply replaces the freedom of Bolshevistic Russia—the freedom of the free-booter—the freedom of the outlaw—with the law and order of intelligence, of experience, and of self-denial, in the interest of the common good—in the interest of efficient operation—and in the interest of survival.

CHAPTER IX

PLANNING AND DISPATCHING

Casual Management

Planning, in Benjamin Franklin's printing plant, was a simple matter. The boss waited on customers and worked with his men. Everybody in the shop could see what work was coming next, and the advice of all was available at a moment's notice. Each one could tell what materials and what tools were ready without moving from his workplace. Comparison of the simplicity of "planning a dinner" for the New York flat dweller—who drops in at the corner Delicatessen on her way home from the matinee, buys what she sees, and serves it in the original package—with what must happen before a modern army can be fed illustrates why systematic planning is necessary in industrial establishments employing thousands of men, distributed through hundreds of departments. The first is an example of *casual management.* The second—if well planned and well executed so that it places the hot food in the hand of the soldier exactly when it is needed, without waste and without undue expenditure of effort, regardless of how many thousands of miles it has come, where it was warehoused or how it was transported—is *scientific management.*

Casual management may produce fairly satisfactory results for the individual—it worked all right in the small shop of Franklin's day; but imagine what would have happened on the western front if no planning and no dispatching had been done and if each soldier had waited until he was hungry before he did his shopping! It sounds so absurd that it doesn't seem possible that the majority of factories are operated under casual management. The reason for this is psychological.

Neglect of Factory Management

In the first place the owner of the rapidly growing industry has usually found it necessary to give most of his time to the sales and financial end of the business. In the second place, the men who have succeeded him in charge of production have not represented the best talent of the organization. As the salesman's life—with its pullmans, its palatial hotels, and its unlimited expense accounts—is more attractive than a job in a dirty, noisy factory, the bright young men in consequence have been attracted away from production work to selling. Furthermore, since the salary a man draws depends to a considerable extent upon his ability to sell his services, those who have remained factory executives have usually been those who were too poor "salesmen" in this respect to market their abilities elsewhere. These "poor salesmen" who remained in the factory have thus been instrumental in keeping factory salaries at a level much below what is needed for the class of work required—with the result that the flow of brains away from the factory has been still further stimulated. Long hours, unpleasant working conditions, poor pay, and loss of caste socially have conspired to drive men of brains and ambition out of the factory.

As a result the foremen—the non-commissioned officers of industry, upon whose ability the efficiency of the industrial army depends—steadily degenerated until the majority of plants were really controlled by men who remained foremen because they lacked the ability to become anything better or because they lacked the ambition to go to work at a machine.[1] A great many foremen were actually more ignorant than their

[1]During the war I knew of scores of cases where foremen threw up their jobs to go back to manual labor because they could earn so much more at the bench or at the machine. A large steel plant in which I did some work before the war was run by foremen paid $75 a month, while the machinists under them earned from $100 to $125 a month. As a result the foremen were either broken-down old men who hadn't the nerve to move on, or young and inexperienced men who wanted the experience and who quit and went elsewhere once they had secured it. See later chapter on education.

men and, as is usual when ignorance and authority are combined, they became the principal stumbling block in the path of progress. This state of affairs was responsible for the fact that a good many of the engineers who made the earlier installations of scientific management found it necessary to take the bulk of the foreman's authority away from him and to reduce

Figure 27. A Planning Department

Note recording clocks which men punch on leaving the window at which they secure their work tickets. This window is reached by entering the door marked "in." Bulletin board on wall.

him to a sort of inspector before anything could be accomplished.

During the war the backward condition of the foremen came to light generally in connection with labor control and resulted, first, in an attempt to take most of his authority away from him and to give it to the employment manager. Subsequently it was found necessary to allow the foreman to retain a good many of his powers, so that now a general attempt is being made to educate him. The result of the exodus of the more able from the factory was that just when brains were

needed most—to cope with the exceedingly difficult problems which arose as our small shops, employing from fifteen or twenty men, grew into great industrial plants employing thousands—they were not available, having been attracted to sales, to finance, and to the professions.

Ignorance of Actual Conditions

In most cases the owner of the large plant has had no idea of the inefficiency which has grown up in the plant. He assumes that because all went smoothly when he or his father or grandfather was working with his handful of men in the beginning, the same methods of planning, dispatching, rate-setting, and the like are still in effect and still adequate. He has no idea of the way things are going. He has no time for details. When he asks the foremen how things are going they naturally—not being entire idiots—reply: "Everything is going fine, Sir!" The workmen in the department which the owner happens to be inspecting always *seem* to be at work—since they aren't idiots either. And so the owner trots back to his comfortable roll-top desk and considers a new advertising campaign or a change in the sales policy with men who at least possess the outward appearance of gentlemen. Is it any wonder that the usual plant—which just grew, like Topsy—is less than 50 per cent efficient?

Unfortunately the worse the plant is the less the owner—or manager—will believe it. Such heresy hurts his vanity and reflects upon his ability, and the worse the plant the greater is the conspiracy of silence among the foremen. Even if they entertain doubts as to the efficiency of the shop, they don't know any better way. Bitter experience has taught them that life in a factory is naturally "just one damn thing after another" anyway—and why should they hunt trouble by suggesting to their superiors that all is not as it should be? Their superiors have troubles of their own and if interrupted are

prone to turn with a snarl of—"Well, if you don't know your job, I'll have to get somebody who does!" When we consider how like a stepchild the foreman has been treated and how little assistance he has had, as to either mechanisms or methods, in the solution of the stupendous problems which have arisen in the last fifty years while the three-man shops have been welded into great industrial units employing from 20,000 to 50,000 men, it is a wonder that the usual factory is run even at 50 per cent of attainable efficiency.

Increased Dividends Through Waste Elimination

Another thing that has inclined the management, abetted by the stockholders, to concentrate on the sales rather than upon the factory has been the fact that the same amount of effort, devoted to boosting prices and to forming combinations to maintain prices, has in the past produced greater dividends than when devoted to making the factory more efficient. Moreover, a manager out of touch with factory conditions is always fearful of labor troubles, if innovations—discouraged by ignorant and reactionary superintendents and formen who fear anything new on principle—are introduced into the plant.

Altogether it has been a case of following the lines of least resistance until the road was closed at home by the revolt of the public, expressed in the recent buyers' strike, and abroad by the necessity for competing with foreign manufacturers. Our next step is to make every big plant as free from wastes of labor, material, and capital as were the small and carefully conducted shops of our forefathers.

Tests of Scientific Management

"But just where does this waste come in?" asks the proud owner of a million-dollar factory in the center of one of our big manufacturing cities. "Haven't I got a new plant, filled with the latest machinery, and don't I pay my 20,000

workmen as much as anybody else in town? My superintendents and foremen tell me I have the most efficiently run plant in the world and haven't I made a million dollars in the last five years? What's the matter with you, anyway?" If this proud parent of an infant industry can answer honestly in the affirmative the questions which follow he is all he thinks he is:

1. Are your materials, supplies, machines, tools, and accessories so standardized that your working force can depend upon them to do 98 per cent of what they should do 300 days in the year?

2. Do you know—or can you ascertain from figures whose accuracy is beyond question—just how much work every one of your men should do every day on every sort of work?

3. Do you know at frequent and stated intervals just what percentage of such production standards each department and the business as a whole is attaining? Do you know the causes —in percentages—of failures to attain such standards? Do all your men average 98 per cent of attainable standards?

4. Do you *know* your machines are all running as much of the time the factory is in operation as your product permits? Do you know from a daily or weekly analysis just what percentage of your equipment is idle and why? Do you know what this idleness is costing you in interest on the investment in machines, buildings, and real estate; in direct and in supervisory labor; in insurance, taxes, depreciation, and the like? Do you *know* that such non-productive charges are reduced to the minimum?

5. Do you know that you are paying interest on material in stock and in process and in labor on semiprocessed material and upon deferred profits for the shortest possible period?[2]

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[2]Merchandise turnover—as rapid and as frequent as possible—has come to be recognized as the secret of success in both the retail and jobbing businesses. Its importance is only just being recognized in a great many manufacturing concerns. Even where the process is necessarily a long one, every day saved means a day's interest on the selling price of the article and so much production capacity released for other work.

6. Do you know what percentage of your deliveries you are falling down on and why?

7. Do you secure, periodically, accurate figures showing by weight or other comparable figure the percentage of waste to raw materials paid for? Do you *know* the causes of fluc-

Figure 28. Standardized Conditions

The floors have been divided into sections and numbered so that all work and gangs may be exactly located by means of the symbols used on the work ticket.

tuation in these figures? Are you certain that wastes are maintained at the minmum?

8. Are you *sure* that the quality of your product is being maintained at all times? Do you receive at regular intervals analytical figures showing the causes of rejections and returns in such a way as to be able to fix responsibility?

9. Is your labor turnover so low that the cost of further effort to induce your men to remain with you—by higher wages

or otherwise—would equal the cost of breaking in new men?[3]

There are a great many other just such questions which could be asked, but if you have been able to answer honestly in the affirmative all those that have been stated, you are operating your factory under scientific management—under management based upon *facts* and not upon opinion, and it is only a question of time before the last vestiges of casual management, of management based upon ignorance, upon vanity, and upon reaction will disappear as entirely from your plant as they can from any organization operated by ordinary human beings.

Some Actual Results

A friend of mine who is the industrial engineer for one of our largest corporations received a hurry call to a newly acquired plant employing 2,000 men to pass upon the necessity of purchasing $250,000 worth of new machines. The manager of the concern was the former owner, who had made several millions out of the business before he sold out to the trust. Machine-use records were installed and it was found that the machines already installed were idle enough of the time to take care easily of the increased output, if properly utilized. Besides the $250,000 thus saved, the expense of a new building was saved, together with insurance, taxes, power, supervision, labor, and similar attendant continuous expenses. By further and similar replacement of casual management with management based upon facts—systematic planning, dispatching, standardization, and the like—at the end of the second year the economies effected were running at the rate of $250,000 a year and in addition the output had been in-

[3] If with a working force of 20,000 men you have a labor turnover of 50 per cent you are breaking in 10,000 new men a year. If it costs you $20 to break in each new man, the annual turnover cost is $200,000. If you could induce half the men who are quitting to remain with you by spending $80,000 in wages and $10,000 for making the factory a more healthful place in which to work, the cost of breaking in the 5,000 new men would amount to only $100,000 and you would still be $10,000 ahead.

creased 37 per cent. This is about the average experience where casual management is replaced by scientific management. Yet this self-made millionaire thought he was the last word in efficiency and it would quite likely have taken bankruptcy to teach him how poorly his plant was really managed.

Two years' similar work in a clothing plant employing 1,250 people increased the output 60 per cent, raised wages 25 per cent, improved the quality of the product, and increased the profits $360,000 a year. In another plant the output was increased 50 per cent, the productivity per man was increased 35 per cent, 10,000 tons of coal per year were saved, and economies at the end of the second year were running at the rate of $200,000 annually—not including the profit on increased output. This sort of thing—all of which was done in progressive plants managed better than the average—seems unbelievable until you have actually taken part in it. Most of it is done by standardization, by the introduction of planning and dispatching, and by building a mechanism which reproduces, as nearly as is possible under present conditions of industry, the close contact between management and men which existed in the old-time shop of half a dozen men.

Purpose of Planning and Dispatching

The principles of planning and dispatching are the same for all types of industries. Mechanisms differ but all operate to the same end—that *the right thing may be available in the right place at the right time.* This was easy in the six-man shop. It is a very different matter in the plant with 10,000 employees in ten different buildings. The amount and type of planning machinery necessary varies with the business. In plants where the continuous production system predominates—the coffee-mill type of plant, where the raw material is fed in at one end and flows through various departments until it finally issues forth in the form of the finished product—as

in the flourmill, the pulpmill, the sawmill, and the brick factory —planning and dispatching are much simpler than in plants operated according to the job production system. The automobile-repair shop and the machine-shop or foundry doing a general repair and miscellaneous special order business are typical examples of this latter class of plant. It should be borne in mind, however, that most plants are a combination of the two systems—that nearly every plant does a certain amount of routine work or of work on standard parts for stock and a certain amount of work on special orders.

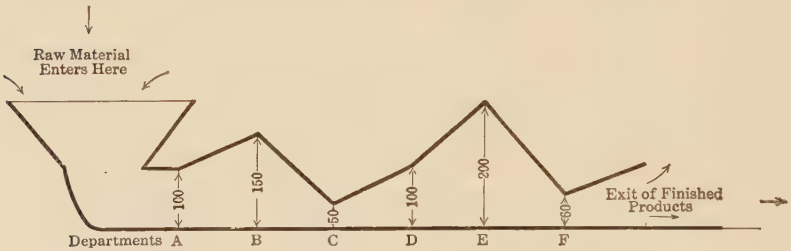


Figure 29. Graphic Analysis of Departmental Capacities

Flow in Continuous Production Plants

In the continuous production plant the problem is to maintain a steady flow of material through the various departments at a rate which will keep each one of them producing to capacity. This sounds easy, but unless the capacity of each department is definitely ascertained and each one is carefully balanced against the others and unless steps are then taken to maintain the flow of work at a fixed speed there will be alternate floods and droughts which will result in each department's alternately suffering from congestion and then loafing for lack of work.

Analysis of the capacity of each department with a stopwatch very often reveals something like what is shown in Figure 29.

The plant perhaps was built to turn out a hundred tons a day—but somehow it never has—for good and sufficient reasons, which the superintendent has explained to the owner in exhausting detail until the boss is tired of hearing his complaints. So the plant runs along on an average output of between 50 and 60 tons a day. When the analysis is made, it is found perhaps that certain drying or furnace processes at *F* take longer than was expected and that the output of certain machines at *C* have not proved to be what their maker prophesied.

Surplus capacity has been provided at *B* and *E*, which are equipped with enough machines to turn out 150 and 200 tons respectively (representing a 50 and a 100 per cent unnecessary investment in machines, buildings, light and heat, and unnecessary expense for insurance, depreciation, etc.). Furthermore, these surplus machines are manned most of the time. Men were assigned to the work because the superintendent did not know how, or did not have time, to ascertain exactly the machine capacity of the departments in question. The machine operators either were not familiar with the machines or would not tell the superintendent that they could turn out 50 to 100 per cent more product for fear that they would have to work harder themselves and that some good fellows would lose their jobs. Or there may be some mouldy tradition about quality and speed being inconsistent. Or extra machines may have to be kept going to make up for loss of output because of frequent breakdowns, unstandardized raw material, or failure of semiprocessed material or tools and accessories to arrive when needed.

Remedy for Uneven Flow

The remedy is, of course, standardization, planning beforehand, so that the right thing may be available in the right place at the right time, and dispatching the right thing to the

right place at the right time.[4] In this particular case the reason why the machines at *F* were not producing to rated capacity would be determined by analytical study and the machines speeded up or—as a last resort—supplemented with one or two more machines. The drying process at *F* would be controlled by the introduction of instruments to record temperature and moisture and the drying time reduced. The men in all departments would be paid in proportion to their attainment of carefully and fairly set standards. The extra machines would be disposed of and the extra manufacturing space—if possible—utilized for some other purpose. Inasmuch as all departments were quite probably overmanned and underproducing, a characteristic result of this replacement of casual management by management based upon facts, would be a daily output of 110 tons with about two-thirds of the working force required to produce 60 tons.

Even where the "squeezes" in the flow of production are less evident than in the case just cited, lack of standardization, planning, and dispatching in the continuous production type of plant usually results in variations in the speed of flow of the product—because of unforeseen interruptions in output in one department after another—which cause the men in each department in turn first to soldier on the job, while waiting for semiprocessed parts to arrive, and then to be so hampered by the congestion of parts which have finally arrived in a flood—like logs in a spring freshet—that they cannot work to advantage—a handicap usually further increased by the vociferous urgency of the foremen, who are endeavoring to break

[4]Further explanation of these terms will follow. In the meantime it is sufficient to remember that planning is what is done before the transcontinental train leaves Chicago for San Francisco. It is decided that in order that the train may arrive at the hour set it must reach Omaha, Denver, Salt Lake, etc., at certain specified times, that fresh engines must be attached at certain places, that diners and food must be ready at certain points. Dispatching consists of the practical means adopted to make this dream come true. Routing, arranging the road by which the train must travel—departments, machines, sometimes the operators—is usually part of planning, although an emergency change in the route in the middle of the journey might properly come under "dispatching." "Scheduling" is a term, somewhat loosely used, to include the writing down of the stations along the route which a particular piece of work is to follow, together with the time of arrival at each one.

up the jam by sheer noise and strenuousness. The immediate result is, of course, succeeding waves in one department after another of semi-idleness—for which the company pays—and of feverish strenuousness, characterized more by bustle than by effective results. The broad result is a plant output consistently below standard.

Time and again I have seen difficulties arise in one department, which even ordinary forethought should have anticipated and provided against, which have partly shut down the department. The men after standing about half an hour would be rushed into some other department, would work to a disadvantage on something which shouldn't have been done, as it only increased congestion in *that* department, and then rushed back to their own department to be urged to impossible endeavors by a frantic foreman who feared the blame for a loss of output which would ultimately be reflected in the total plant output. Meantime this traffic jam upset every department, just as surely as a fire on Fifth Avenue at 5 P. M. is sooner or later felt on every artery of traffic within a mile of it. The dispatching of traffic on Fifth Avenue by means of the signal towers increased the carrying capacity of the street nearly 40 per cent, because more square feet of pavement were thrown into continuous and steady use and because the pressure behind each congestion was reduced. Dispatching does the same thing to a factory.

Requisites for Power-Regulated Speed

Where the speed of flow in the continuous production plant is mechanically regulated by a chain or belt, as in the final assembly at the Ford plant, the establishment of a power-regulated speed implies standardization sufficient to regulate the speed of all proceeding processes, so that every part arrives at each subsequent point at the time planned. A vast amount of planning and standardization are here supplemented by

mechanical dispatching—by means of the chain assembly. Even so, unless the amount of work each man should do is carefully ascertained it is possible to have millions invested in standardized machinery and a working force only 70 or 80 per cent efficient. Not long ago I spent some time in a large motor plant in which this was the case. While there were some notable exceptions, the men working along the chain drive assemblies were not averaging over 80 per cent efficient.[5] I discussed this later with an industrial engineer, a number of whose men had worked at this particular plant, and he told me that the firm was willing to have their workmen only 80 per cent efficient in view of the possibility of getting out a few more cars per day—upon which the profits were large at the time.

Flow in Job Production Plants

As the continuous production plant merges into the job production type departments are replaced by machines. Instead of 100 tons of raw material moving from department *A* through departments *B, C, D,* etc., in regular order, and finally emerging from *F* as finished product, half a pound of steel—destined for a particular part of a particular machine belonging to a particular firm—perhaps starts from a storeroom, is taken to a machine in department *X* on the top floor of one building, is then machined in another building—say in department *B*—returns to department *X* again, and finally emerges from *A* ready for the final assembly. Under such circumstances the necessity for laying out a particular route for this piece to travel is at once evident. Thousands of other pieces are traveling by different routes to and from the same machines. Suppose they all arrive at Bill Jones' machine in department *X* at the same moment. Bill would be as badly off as would the railroad passengers if all the transcontinentals

[5]See chapter on rate-setting.

tried to run trains over all their cross-overs at the same time.

Furthermore, we must have this part ready to ship at a certain time or we'll lose a customer. Before we can ship it, it must be united with certain other parts It has got to meet these parts somewhere. Besides we don't want these parts or the piece itself trucked around any more than we can help, as trucking costs money. We want to keep our machines all busy and we must have work enough ahead for each of our 5,000 men so they will feel justified in doing a good day's work. And how do we know how long this job should take each man anyhow? It begins to look pretty complicated, doesn't it? At any rate, Mr. Factory Owner—who is analyzing the situation—has a luncheon engagement with a clever advertising man, so he draws himself up and says, "I believe in hiring competent foremen and leaving the details to them," and departs.

This is too much to expect of a lot of poor, ignorant, underpaid foremen, but that is just what has been done in the majority of cases. In England I went through a plant employing over 12,000 men. I asked the man who was showing me through how they planned their work.

"The foremen circulate around, into each other's departments, and see what is coming to them next," he said.

"But don't parts sometimes get lost?" I asked.

"How the devil could they lose a twelve-inch gun?" he retorted.

And there you have it—the rough-and-ready answer blocking further inquiry—the answer generations of foremen and superintendents had made to generations of inquiries—if any have paused to analyze and ask.

The Production Clerk

In plants where parts were smaller and must journey to more machines at higher speed, snarls, wrecks, and losses

occurred so frequently that they could no longer be ignored by "passing the buck" to the foreman. In such plants there grew up an institution known as "stock-chasers"—a motley crew—each one half Hawkshaw and half Paul Revere—whose business it was to trail lost parts and to rush madly through the plant shrieking that an order was overdue—"the customer and the sales department are upon us! Speed, lest all perish!" These poor fish were usually under a sort of super-Hawkshaw known as the "production clerk" who acted as whipping boy for the superintendent and who was alternately roasted and canned as the sales department descended upon the factory, clothed in the habilements of wrath, oratory, and a silk shirt.

The production clerk—under casual management—had no authority in the plant, but he received copies of the production orders when they were issued from the engineering department and he was supposed to know by instinct—and the aid of his tatterdemalions—just where some thousands of parts were, what had been done to each individually, and how long it would take to perform subsequent and diversified operations upon them sufficient to permit their delivery to the customer when wanted. Wasn't he the production clerk and hadn't he been given a copy of the production order? Well, I should think he ought to know!—and the superintendent and the sales manager—having placed the blame, retired to their private offices with as much satisfaction as if they had really done something constructive. In the meantime the workmen were free to select the jobs on which they could make the most money, piece rates having been set by bargain and not by analytical time study. Foremen didn't like to start trouble in their departments and so, except in case of a descent from the sales department, things followed pretty much the line of least resistance with facility in excuse-making taking the place of efficient operation.

Elements of All Systems

Gradually the solution is being worked out. About fifteen years ago the pioneer industrial engineers—Taylor, Emerson, and Gantt—began to give to the world definite planning systems. These have been widely elaborated upon but the underlying principle of all may be said to consist of three elements:

1. The establishment of a definite *time* for each operation, —by means or *standardization.*[6]
2. *Planning*—on paper—to perform these operations in the most advantageous sequence, with due consideration for the other work in the plant.
3. *Dispatching* each part through the plant in such a manner that it arrived at the various stations by the *route* planned and at the time *scheduled.*

1. Standardization

It is obvious that you cannot plan jobs to a machine until you know approximately how long each job will take. It also follows that the more exactly you determine the time required for each job the less likely you are to make errors in scheduling which will throw the whole plan out and perhaps result in the necessity for rerouting and rescheduling all the jobs in the department. Standardization of materials, machines, tools, and equipment is therefore necessary. (See Chapters VIII and XI.)

2. Planning

Planning methods vary with every plant and serve as a means of self-expression for every industrial engineer who installs a system, but essential parts are:

(a) A reservoir (see Figure 30) of some sort—usually a file—for orders which are ready for the plant. The receipt

[6]Remember this includes all the activities that come under personnel direction and tend to maintain the quality of the workman through his health and happiness. See Chapter VIII, page 185.

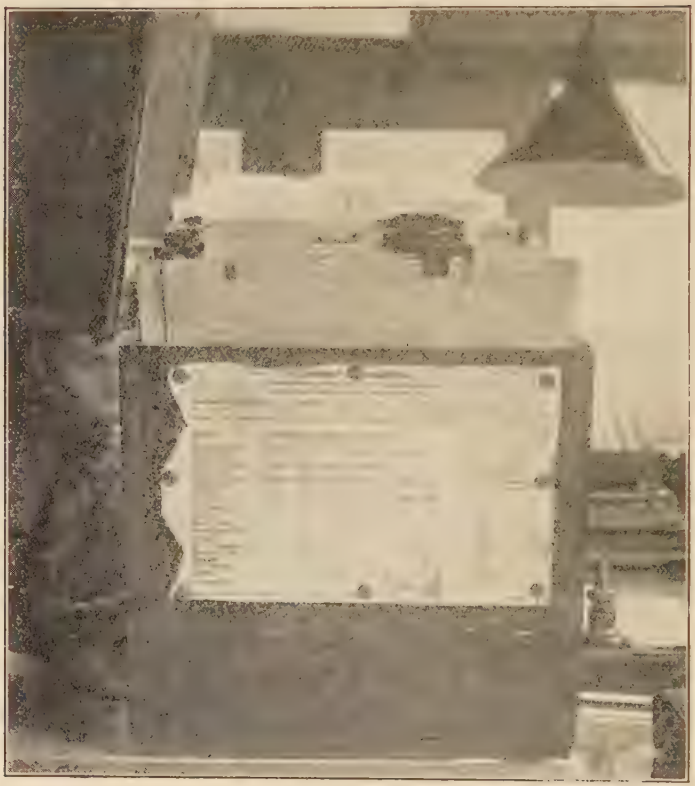


Figure 30. One Type of Reservoir

The plant orders are filed at the back. As the time approaches for them to be put "in work" the salient facts are entered upon the master schedule (Figure 31), which is classified according to urgency and material—it being desirable in this case to run the department on the fewest possible materials each day—by means of the colored "flags" shown attached to the tops of the master schedules.

of such an order in the planning department assumes that the management permits manufacture for stock or that a sale has been made, has been approved as to credit and design, has passed the drafting-room, and is ready for the shop. The date of delivery promised the customer is usually the control which determines the date on which the production orders are transferred to the "in work" mechanism, which consists of—

(b) A dissecting mechanism (see Figure 31) by means of which the order is split up into its elements and the time for processing each part is looked up or determined.[7] In a completely standardized plant a symbol on the order would locate all such information in the "library." Even where the

DATE RECEIVED 6-23-21 — MASTER SCHEDULE — ORDER NO. C2088
DATE PROMISED 7-30-21 — DATE 6-21-21
REMARKS — LOT NO. 2 — NEW MOULD REQUIRED Yes

MIX		30	30	7	7	73										
NO. PCS.		300	100	50	150	75										
DESCRIPTION		B1	E1	E2	E3	D4										
UNIT WT.		20	10.5	6.5	3.2	9.7										
TOTAL WT.		6000	1050	325	480	723										
GANG NO.		463	463	460	460	461										
	M	G	G	G	G	G										
	T	M	M	M	M	M										
	W															
	T															
	F															
	S															
	M															
	T					D										
	W															
	T	D	D	D D	D	D										
	F	S^2 D	S^2 D	S^9	S^9	S^2 D										
	S	S^2	S^2			S^2										
	M			S^9	S^9											
	T															
	W															
	T															
	F															
	S															
	M															
	T															
	W															
	T															
	F	Dr. Dr.	Dr. Dr.	Dr.	Dr.	Dr. Dr.										
	S			Dr.	Dr.											

Figure 31. One Type of Dissecting Mechanism

This sheet is used to dissect the order and to determine the day each section must pass the various stations on the road of manufacture in order to make the delivery required. Italic figures indicate date planned; roman figures indicate date actually finished.

particular machine had not been previously manufactured reference to master time schedules[8] would, with very little difficulty, permit determination on the time element to the

[7] One of the commonest ways of doing this is to split the order up into jobs for certain machines—requiring a full day's work where possible—and to enter the whole thing on workmen's tickets. (See Figure 32.) The date the work is actually performed is then added when the work is started in the shop.

[8] These give the time required for elemental and common operations such as drilling through a certain thickness of a certain metal and like standard operations.

point where one or two experiments would reduce the unknown time element to an inconsiderable fraction of the whole. Where standardization is incomplete operation times are necessarily estimated.

In doing this work due consideration must be given to the time at which work on each part of the machine to be fabricated must be started in order to insure its uniting properly

———— PRODUCTS CO.					LABOR SERVICE CARD		
NAME EMPLOYEE				MAN NO.	DEPT. NO. 84	DATE	
STARTED	CONTINUED	FINISHED	WITH NO.	MACH. NO. ND-	ORDER NO. D-3517Q	OPER. NO. DL-30	ACCOUNT NO. L-D-8-1
DELAY AND CAUSE							STD. TIME 8-0-0
OPERATION							TIME FINISHED
QUANTITY 300	PRODUCT MXQVR		MAT. √	PCS. DONE	WT. DONE		TIME STARTED
							TIME ELAPSED
							RATE .45
							WAGES
							BURDEN .20
							TOTAL

Figure 32. Work Ticket or Service Card (in triplicate)

White, blue, and pink copies are clipped together with carbons between until the job is given to the workman, who is given the white copy (original), while the other two remain in the top pocket of the dispatch board. When the job is finished all are clipped together again and the time entered, after which the white ticket goes to the timekeeping department in order to figure the man's wages. The blue copy (duplicate) is used to figure the cost of the job, and the pink (triplicate) to figure the departmental cost.

with the other parts at various assembly points as all the parts progress through the plant. This amounts to the determination of separate control dates for each part of the order and is called "scheduling." The most advantageous route—from the standpoint of cutting down handling costs, from the standpoint of the most suitable machine for the work, etc.—is considered at this time also.

The tools, jigs, and accessories required are determined

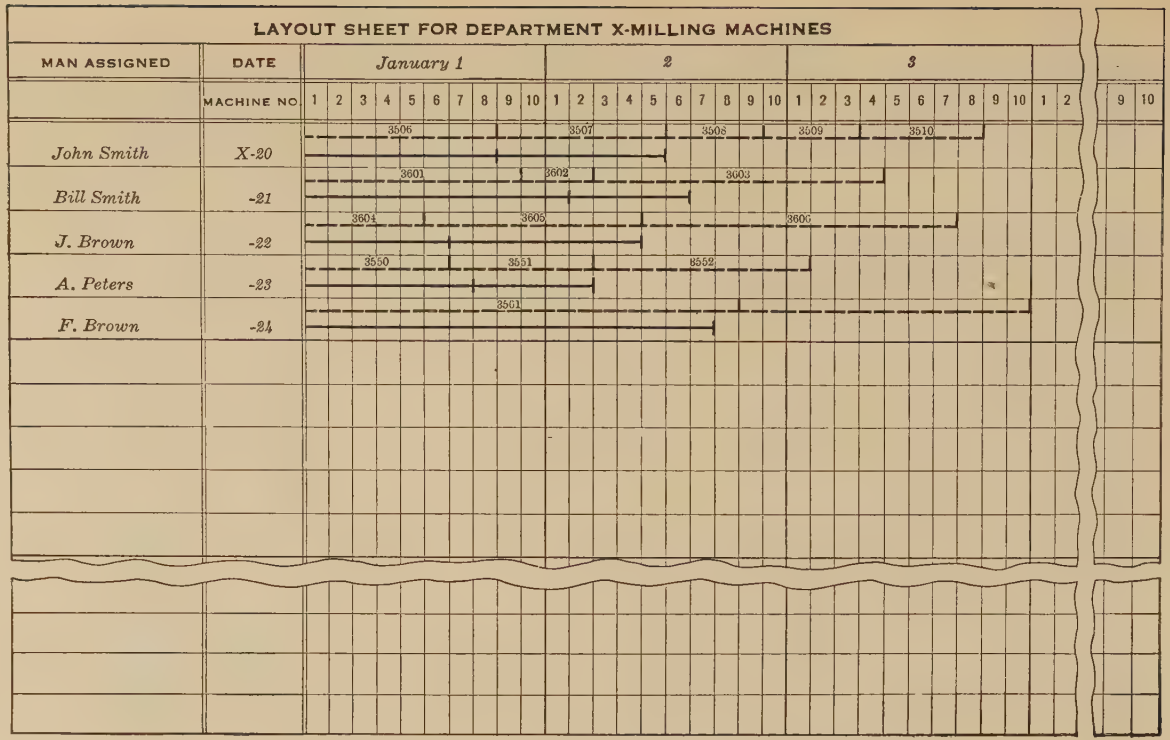


Figure 33. One Type of Planning Mechanism

Dotted lines indicate jobs planned in standard time. Figures indicate job numbers. Solid lines indicate actual time. The chart shows the status of the department at the end of the seventh hour on January 2.

Figure 34. Dispatch Board Containing Work Tickets

Note decimal time clock and window at which workmen receive the work ticket for the next job upon turning in the ticket for the completed job.

and sufficient material is reserved in the plant stores. In doing this work arrangements are made for the issuance of the proper tool orders, inspection and move orders, and for processing in lots which will reduce unproductive machine changes ("set-ups") to the minimum.

(c) A planning mechanism (see Figure 33), by means of which the new order is fitted into the existing orders already "in work" in the plant. The commonest form of planning mechanism is a large sheet of paper upon which the most urgent orders, pushed out of the reservoir by means of an automatic tickler of some sort, are entered opposite the machines, operators, or departments which are to do the work. Continuous measurement of actual performance against work planned is an essential to efficient planning.

3. Dispatching and Graphic Control

(a) A dispatching mechanism (see Figure 34), by means of which orders to perform the work are dispatched to the operators who are to do the work. This is usually accomplished by means of work tickets (see Figure 32) arranged on a dispatch board, making it possible to determine at a glance:

(1) Just what each man is doing.
(2) Just what he is to do next.
(3) How much work is planned ahead for him.

Adjustments caused by failure to perform work as planned are made on this board, which usually consists of the three pockets illustrated, the lowest of them containing a "reservoir of work" sufficient to provide for any ordinary accident.

(b) Certain graphic control mechanisms designed to emphasize for the benefit of both executives and men the essentials of effective manufacture and to direct attention continuously and immediately to the attainment of, or the failure to attain, standards of output, quality, waste avoidance, etc.

Summary of Methods

We have endeavored to show why systematic planning is necessary and to summarize the remedy for the conditions that developed—the growing pains as it were—as industry expanded from the three-man shop into the plant employing 1,000—or even 50,000—men. Throughout it all the trend has been unmistakably from the job production toward the continuous production shop, toward a standardized product.

This tendency has reached its limit, at present, in progressive manufacturing in the motor industry, where the speed of the continuous progress is mechanically fixed. Where this has been impossible, the speed of the product has been regulated by feeding material into the plant and into each department at a fixed rate—so that each department had to process its quota or be buried under the accumulation. When the variation in the work done was too great for this, planning mechanisms have been designed to organize the sequences of machines required for certain sorts of jobs, regardless of where the machines were located, into continuous production plants, as it were. Even the most stubborn repair-shop—where the next job depends almost upon the whim of fate, upon a skid on the wet pavement, or a crash with a street-car—is amenable to a certain amount of systematic planning. A dispatch board—showing what each mechanic is doing and what he is to do next—can be made to cover the majority of the men, and a reservoir of stock work can be installed showing what each man is to do when not otherwise occupied.

The Planning System and Dividends

In installing the system great care must be exercised to avoid being so carried away with enthusiasm as to sacrifice common sense to the love of exactness. The president of a company which contains one of the most famous installations of scientific management in the country—a man thoroughly

convinced of its value—told me that his company was using only 80 per cent of the system insisted upon by the engineer—that the other 20 per cent had cost more to maintain than it earned—and so had been discarded. The same tests by which the efficiency of the business is judged must be applied to the planning system and every mechanism—no matter how clever, how dear to its progenitor, or how necessary to make a "complete installation"—which does not pay for itself and earn a dividend in time and material saved and in capital utilized, must be ruthlessly rejected.

One reason why some of the more conservative manufacturers have hesitated to install scientific management has been their fear of increasing their "overhead" or non-productive expense. In one installation of considerable size the "stock-chasers" who already existed were replaced by two-thirds as many clerks in the planning department. The salary list remained about the same, as higher class men are required for systematic planning than for foot work around the plant. In one of the oldest installations of scientific management, in which every refinement has been developed to the utmost, 14 per cent of the entire factory force are engaged in planning and kindred work. My own experience has proved to me that either productive plant labor or non-productive plant labor is decreased sufficiently by the introduction of scientific management to pay for all extra overhead expense at least ten times over. "Overhead" is not nearly so dangerous as "total labor cost per unit produced." The men who demand facts —not opinions—from subordinates are rapidly learning that.

In this chapter we have endeavored to trace the development of industry which has made scientific management necessary and to touch briefly upon the theory of systematic planning and dispatching and their development in America. In the next chapter we will discuss the development of the same elements of scientific management in Europe.

CHAPTER X

EUROPEAN METHODS OF PLANNING AND DISPATCHING

Scientific Management in France

Scientific management has made a very strong appeal to France and is gaining ground rapidly, thanks to the efforts of such men as Henri le Chatelier and Charles de Freminville, who, both by their lectures at the Sarbonne and by their work as engineers, have demonstrated its value to industry. It was officially adopted by the government for use in plants manufacturing war materials and a thorough exposition of it is a part of the military training of the French army officer—and of the officers from other countries taking the French military courses. I discussed the situation at some length with the gentlemen mentioned and with J. de Morinni who is installing scientific management in various plants in France and Belgium. There seems to be something about the substitution of systematically gathered and carefully correlated facts for the purpose of industrial management which makes a strong appeal to the logical French mind.

The idea is not entirely a new one in France, for considerable research work was done and some application of the principles of standardization and time study was made over two hundred years ago by Vauban, the celebrated military engineer (1633-1707), and later by Coulomb, the scientist (1736-1806). Without doubt a wider and more rapid application of their discoveries to industry would have been made as industrial units grew in size had it not been for the deep respect each French workman has for the individual methods developed by his own father. This has resulted in an indi-

vidual standardization, which the push-carts full of fearful and weird instruments wheeled about the streets of Paris by repair men exemplify. In certain machine-shops where industrial engineers I have known have worked, this trait has led to a most embarrassing variety of tools. Moreover, each workman can be separated from his own tools only with the greatest difficulty.

Some Notable Examples

During the war a very complete system of planning and dispatching was installed in L'Atelier Central de Reparations du Service Automobile, with route cards, work tickets, instruction cards, stores ledger, and all the usual mechanism of scientific management. Symbolization was very complete and the planning boards developed embodied some unusual features, such as the use of various colored T-shaped tickets and disks to indicate graphically the progress of the work on each vehicle. Each job is represented on the board by a movable tablet perhaps 2 x 10 inches in size, equipped with two rows of pegs, upon which the tickets and disks are hung so that the state of the work on each vehicle being repaired is evident at a glance.

The installation at the Penhoet shipyard, which employs about 3,000 workmen, is especially complete as to instruction cards. Considerable standardization work has been done and the planning sheets display some unusual features. In the standardization of labor, especial attention is given to dividing preparation time from machine time and handwork time, and a different fatigue allowance—shown on the instruction card—is made for each. An installation of scientific management in a powder plant during the war resulted in an increase in the output of each worker amounting to over 300 per cent in less than two years. The equipment, picking tables, etc., were standardized and the motions of workers were studied and

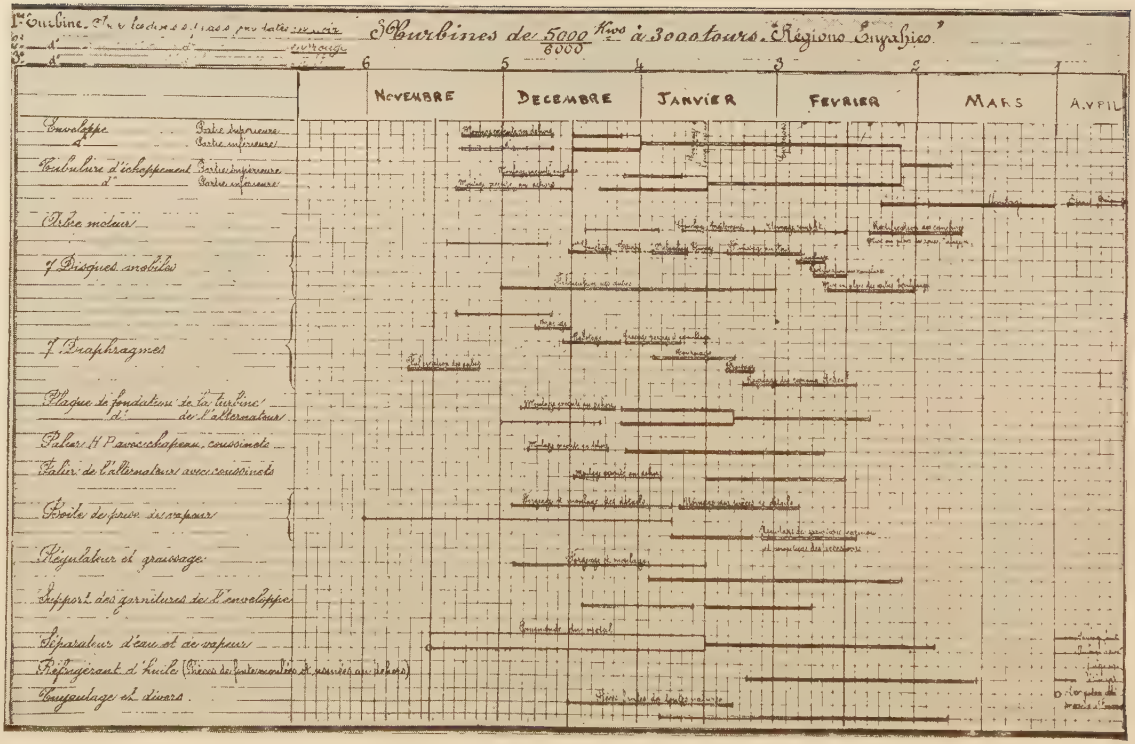


Figure 35. French "Flow Chart" Showing Method of Planning Turbines

those which were unnecessary were eliminated. Individual production bulletins were posted and very complete instruction cards were devised.

There is an excellent installation of scientific management at St. Nazaire and the work at the Schneider plants is particularly interesting—there being over 100,000 instruction cards at Le Creusot alone. At a plant manufacturing aviation motors, planning is particularly complete, and at another dispatching has been carried to the point where every move of every part is planned from the central office. The planning charts in most common use are similar to those used at the Tabor Company in Philadelphia or to the Gantt chart (see page 229), planning boards being a more recent development. Stores control is particularly good in the more modern French plants.

Progressive Machining

In a certain large locomotive plant I found progressive machining in use and an excellent graphic planning chart for Pacific and Mogul locomotives. The major operations were indicated in sequence by number in the vertical column at the left—the first operation number starting at the bottom of the sheet. The dates ran from left to right across the top of the page. A curve then drawn upward and to the right—from the lower left-hand corner of the chart—indicated the planned date for each operation. The actual date of each operation was indicated by a dot or a short line inserted on the horizontal operation number line beneath the date upon which the operation was actually performed. Each locomotive was represented by different colored curves and dots and the whole thing showed the degree of adherence to the planned manufacturing schedule in an exceedingly forceful manner.

In this plant the machine standardization books, which contained complete information in regard to each machine and

the output which scientific experiment had established for it, were particularly well worked out. The shop layout had been given close attention with a view to avoiding carrying materials in process twice over the same ground, and each floor section was clearly numbered. All castings to be machined were whitewashed, and machining, where possible, indicated upon them in pencil. All material and tools were

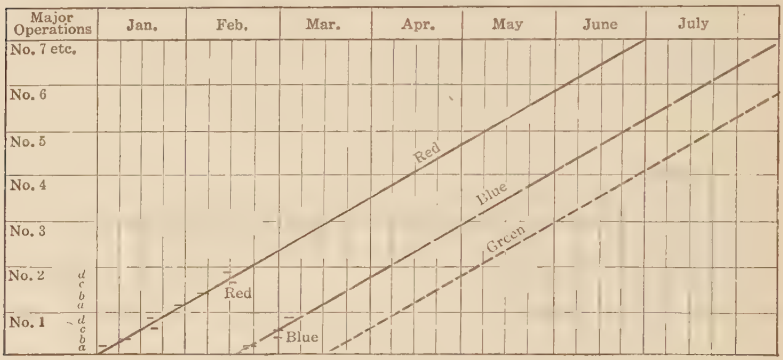


Figure 36. A Graphic Planning Chart

collected and delivered to the machine before the workman was allowed to start on the job. Very complete instruction cards, carrying unit operation times, sketches of the work to be done, and full directions for carrying it out were in use.

In a large forgeshop, standardization, planning and dispatching, and instruction cards resulted in increasing the output per man per day 36 per cent in spite of the fact that the working day was cut from ten to eight hours during the period. In a certain group of very modern machine-shops I found toolrooms, standard tools delivered to the workmen, and all the most approved Taylor methods.

A Well-Developed Planning System

The planning system in use in one very large French establishment working mostly on heavy parts is particularly

MÉCANIQUE GÉNÉRALE ET TURBINES

FEUILLE D'INSTRUCTION N° 60/7

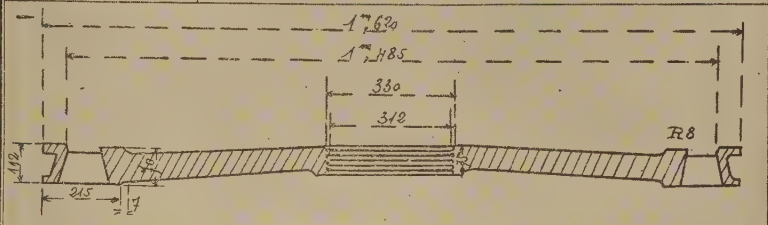
COMMANDE 17018 [illegible] Société Hâvraise

Pièce à exécuter : 56 A et B — Métal : Fonte

Opération : Tourner et alèser le diaphragme N° 6 les 2 parties étant assemblées

Genre de Travail : T V — Catég.

Machine : T V — N° 945



Les cotes du croquis ne sont données qu'à titre d'indication. Voir le plan n°

DÉTAILS DE L'OPÉRATION	VITESSE	AVANCE	OUTILLAGE	MANUTENTION	COUPE
Monter sur le plateau sur cales d'épaisseur				20	
Centrer suivant tracé et joint				60	
Placer les 2 outils les règler mettre les chariots en place				15	
Dresser la face opposée aux aubes - 1 passe ébauchage long 90	2,25	1,09			40
Règler l'outil pour ébaucher la face prolongeant le moyeu				5	
Dresser la face prolongeant le moyeu 2 passes - long 40	2,5	1,09			28
Changer l'outil				5	
Finir l'ébauchage de la même face avec outil à dresser	2,5	1/2 main			10
Pendant ces opérations ébaucher le diamètre extérieur	2,25				
Avec deuxième chariot	2,5	1,09			
[illegible]					
Changer les outils et les règler				10	
Ébaucher l'alèsage 1m485 long 60	2,25	1,09			26
[illegible] temps ébaucher la face du moyeu	2,25	1,09			
Ramener les chariots, enlever les outils, desserrer les taquets				8	
[illegible] retourner et remonter au pont				30	
Placer les cales d'épaisseur centrer le diaphragme suivant tracé et joint				30	
Placer les outils et les règler				10	
				193	

Temps alloué par pièce [illegible] Prix 35f00 — A Reporter

Mise en train 1h Prix 1f 40

Figure 37. French Instruction Card (*Feuille D'Instruction*)

Pages 2 to 4 of this form (not shown here) are practically the same as the lower half of this page.

worthy of study. The foundation of the whole thing is the *feuille d' instruction,* or instruction card illustrated (see Figure 37). As will be noted, the number 60 in the left-hand upper corner indicates the group of instruction cards, of which this is the seventh. To the right is given the usual information as to the order number, the number of pieces to be machined, the description of the operation, the machine number, etc. Below is a sketch giving the dimensions of the completed piece and underneath the detailed instructions to the workmen including the speeds, feeds, tool, cut, etc. At the bottom is given the total time allowed per piece and the piece rate in francs.

Pinned to this *feuille d' instruction* is a *bon,* or work ticket, giving the name of the man who is expected to do the work, the rate per piece, the estimated time, the actual time, the record of inspection and similar information, as shown by Figure 38. On the back is the record of tools received and returned and the delays with reasons therefor.

The issuance of this instruction card and work ticket necessarily implies standardization. The two are pinned together and inserted in the folder marked *fiche de fabrication* (Figure 39). This folder contains on its face a digest of the *feuille d' instruction* sheets inside, which summarizes all the operations that are to be performed on these particular parts of the machine. Altogether in this particular case there are 17 such operations, each one of which is covered by a separate *feuille d' instruction* and *bon.* It will be noted that this *fiche de fabrication* gives the number of pieces in each lot, the machine, the estimated time, and the actual time for each group of operation.

There is also a material schedule, *situation des pieces brutes principales,* upon which is worked out the dates at which the raw material for each part will be needed, and when it is received, an account of follow-up letters, and like information.

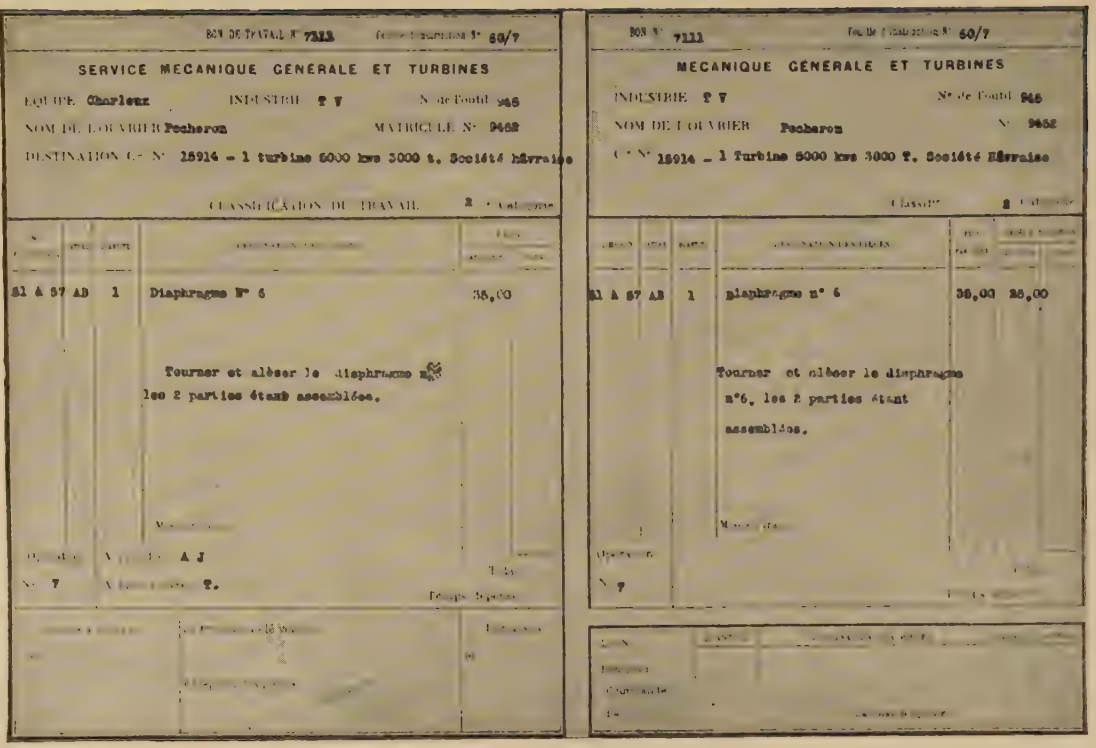

SERVICE MECANIQUE GENERALE ET TURBINES
MECANIQUE GENERALE ET TURBINES
Diaphragme N° 6
Tourner et alèser le diaphragme n° les 2 parties étant assemblées.
diaphragme n° 6
Tourner et alèser le diaphragme n°6, les 2 parties étant assemblées.

Figure 38. French Work Ticket (*Bon*)

On the back of this form are entered the record of tools received and returned and the delays and reasons therefor.

MÉCANIQUE GÉNÉRALE ET TURBINES Le 1

COMMANDE N° 16914 - 17016 Turbine 5000 Ects - 3000 tours

Société Havraise - Station Centrale

Pièce à exécuter : Parties supérieure et inférieure de diaphragme de turbine

FICHE DE FABRICATION N° 60

DÉSIGNATION DES OPÉRATIONS	QUANTITÉS 1er Lot	QUANTITÉS 2e Lot	MACHINE	TEMPS PRÉVU	TEMPS PASSÉ 1er Lot	TEMPS PASSÉ 2e Lot
1. Vérifier - tracer le joint, la rainure et les rayons pour le tour	14	14	TRA	28	25 50	33 00
2. Raboter le joint et les rainures	14	14	R 439	46 66	60 50	48 50
3. Tracer les trous d'assemblage et de tirefonds	14	14	TRA	10 50	12 00	10 00
4. Percer, lamer et tarauder les trous d'assemblage et de tirefonds	14	14	AJ	12 60	15 50	10 25
5. Perçage des trous de fixation des règlettes	14	14	AJ	16 80	18 00	15 30
6. Rectification des joints	14	14	AJ	42 00	40 00	36 30
7. Tourner et alèser	7	7	TV	130 00	175 00	140 00
8. Meulage des aubes	7	7	TV	49 00	65 00	42 00
9. Traçage pour rectification des canaux	7	7	AJ	56 00	70 00	60 00
10. Ragréage des canaux	7	7	AJ	308 00	370 00	315 00
11. Ebavurage et polissage	7	7	AJ	140 00	178 00	164 00

Figure 39. Folder for Instruction Card and Work Ticket (*Fiche de Fabrication*)

From the information in *fiche de fabrication* and the material schedule it is possible to predict very closely when the job will be complete and when it should arrive at each station along the route. This is all laid out graphically on the manufacturing schedule, a chart of the Gantt type, upon which the time is platted.

As each operation is to be performed the instruction card is given out with the work ticket. These are returned to the planning department when the particular job is finished. Since the man in charge of the *fiche de fabrication* knows how long each operation should take and what is coming next, all can be prepared for the work. Furthermore, as the progress of each element is checked up as the actual work is compared with the planned work in the spaces provided, any changes necessary can be made in the general plan and on the manufacturing schedule. Altogether the whole system is very complete, simple, and effective and, so far as it was possible to judge, the results being obtained were excellent.

Progressive Manufacture in France

Progressive manufacturing in France has developed principally in the automobile industry, just as in America, because that is a comparatively recent industry which has been free to develop in newly constructed factories and under modern management methods, unhandicapped by a mass of tradition, "rule-of-thumb," and inherited prejudice, masquerading as "experience." The men who have gone furthest in France, just as in America, have many of them been men attracted from other lines of business endeavor who have brought a fresh viewpoint to bear on the science of manufacture, with the result that originality has flourished and methods have been adopted on the basis of careful analysis of existing factors.

Certain elements of progressive manufacturing existed in

all three of the French automobile plants I visited. In one of them it amounted to little more than routing all the machines through the factory in one direction. In another it was evident that the management possessed a very good idea of the principles involved and were putting them into effect as fully as was possible without some mechanical means of regulating the progress of the product through the plant. The third plant might have been located in Detroit or Cleveland or in any other American center of modern automobile manufacture. Machine tools were arranged for progressive machining and a power-driven chain assembly was in process of installation.

Manufacturing Programs

In this last plant a regular manufacturing program, outlining the work to be done during the following six months, is decided upon, and is dissected and studied in much the same way as in America.[1] The work is then laid out by operations on a basis of time required for each process, and the work is classified as to urgency. In other words, the route being fixed by the factory layout, the time schedule is made out. This schedule is worked out for the cars in lots of a hundred from the instruction cards, which are very complete, containing a detailed sketch of each part and the unit times for each operation.

Orders are issued to the various foremen in accordance with this schedule and to the men by means of the usual work ticket, which has the usual information, including a space in which to record spoilage, and is accompanied by the instruction card, giving the time allowed, etc. As the parts are completed they are sent to the stockrooms, where parts sufficient for a thousand cars are always maintained. This minimum is assured by means of graphs, such as Figure 40.

As the parts are issued for assembly the line *AB*, repre-

[1]This amounted to 120 cars per day at the time of my visit.

senting the number of parts in stock, is swallowed up by the solid shading representing stock issued. A regular stock ledger is kept in addition, showing the balance of stock, requisition number, to whom and when parts are issued, etc. In the case of stores—raw material and parts purchased outside the plant—certain follow-up data are added.

The plant has a central planning department from which the work is dispatched, the necessary changes in schedule being

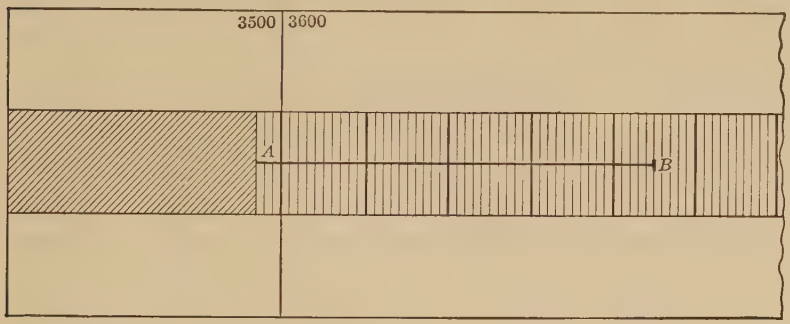


Figure 40. Stock Control Graph

made to accommodate such variations from the plan as are necessary. The toolroom is very complete, although no effort has been made as yet to deliver tools to the men with the work ticket.

At another plant, which was not so perfect mechanically and in which the plant layout had not been so carefully worked out, move tickets were in use and the dispatch offices located in each department were very completely equipped with control charts and graphs. As nearly as I could determine, they had developed a variety of decentralized systematic control, such as I found in certain plants in England.

Mass Production in Germany

In the largest and most modern German factories mass production has been highly developed. Standardization has

been carried out with characteristic German thoroughness as regards materials, labor accessories, and procedure. Labor standarization, especially as regards training, discipline, and fitting the man to the job, has been carried to a point in Germany which has resulted in an organization that makes instructions of the "fool-proof" variety much less necessary than in the majority of countries. By training a boy for a certain job, inculcating in him admiration for that job, inspiring him with a love of order and organization, and with a respect for authority which amounts almost to a religion, a type of workman and foreman is produced which functions like a part of a well-oiled machine. Each man just exactly fits and the organization runs without friction. For this reason much "system" which is necessary in America, where we are all trained for limousines and luxury, and in England, where the freedom of the individual is a fetish, is entirely unnecessary. A factory manned by a highly intelligent, highly trained and organized working force can be run by entirely different methods from one manned with machinery, supplemented here and there by strong backs and weak heads. This must be kept in mind while reading what follows.

Progressive Manufacture in Germany

Progressive manufacture is the key-note of one large plant in which I spent several days. The plant is designed for that system, everything from materials and building to sales propaganda has been standardized to the extreme limit, and the products of medium size move through majestically in large masses in a manner which makes for high quality and low production cost. Each article of the sort manufactured passes systematically on small cars from machine to machine, advancing step by step to completion. On the way it pauses in various intermediate storerooms which act as "reservoirs of work" between departments, so that each department may

work its hardest at all times without running out of semi-processed material and without swamping the succeeding department. The larger machines follow the same general plan. The rough castings, weighing tons, enter at one door of a special department, pass systematically, transported by cranes, to the lathes, milling, planing, and drilling machines, and are then fitted together in the erecting department as one single machine. This is then provided with certain parts from other departments, is painted, tested,[2] and passes out complete, without having made a detour.

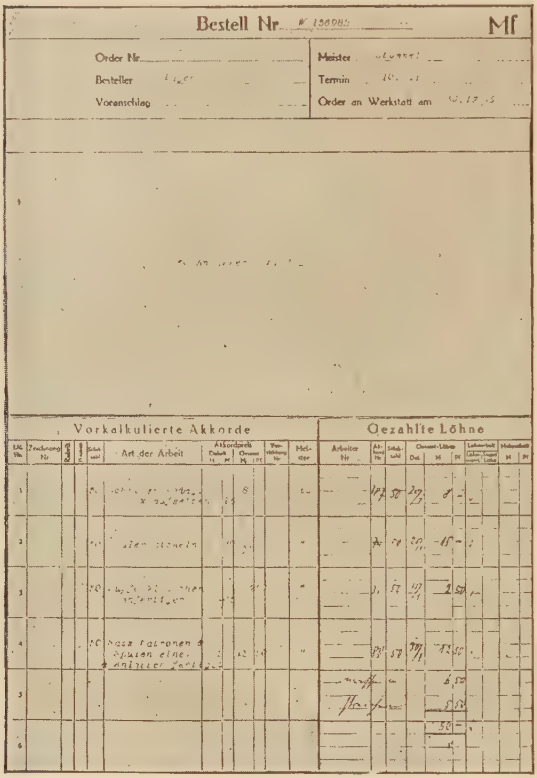
The smaller machines are manufactured in such large quantities that it is possible to lay out a manufacturing program and work from the standard parts in the stockrooms, the principle requisite being to have plenty of small parts distributed along the way in the departments where they will be required. In the case of the big machines the parts needed are collected and put together systematically just before they are used, at the floor section set apart for the assembly of the machine.

Forms Used

The path of an order through the organization is shown by a chart (see Figure 5, page 55), and the methods of assembling the cost by another chart (see Figure 4, page 49). Upon the receipt of the order at the plant there is made out at the general factory office a folder containing:

1. A forecalculation sheet (Figure 41), which contains full information about the order, including the date of delivery required, and which sets the price per piece for doing each part of the work. The sheet also contains space to enter, after the work is done, its actual cost, so that the estimated and the actual will be compared. The original of this form

[2] A red card is attached to parts which prove defective at any of the testing stations.



Bestell-Nr.	Barer Lohn	Zuschlag	Material	Hilfs-Zuschlag	F. Kosten	Meldepreis	
000000	0000 00	000 00	00000 00	000 00	00000 00	00000 00	00
111111	1111 11	111 11	11111 11	111 11	11111 11	11111 11	11
222222	2222 22	222 22	22222 22	222 22	22222 22	22222 22	22
333333	3333 33	333 33	33333 33	333 33	33333 33	33333 33	33
444444	4444 44	444 44	44444 44	444 44	44444 44	44444 44	44
555555	5555 55	555 55	55555 55	555 55	55555 55	55555 55	55
666666	6666 66	666 66	66666 66	666 66	66666 66	66666 66	66
777777	7777 77	777 77	77777 77	77777	77777 77	77777 77	77
888888	8888 88	888 88	88888 88	88888	88888 88	88888 88	88
999999	9999 99	999 99	99999 99	99999	99999 99	99999 99	99
123456	789101112	131415 1617	1819202122 2324	2526 2728 29	3031323 3343 36	3738 39 40 41 42 43	1115

Figure 41. Forecalculation Sheet and Hollerith Machine Card

On this sheet the "planned cost" and the "actual cost" are computed.

remains in the general factory office in the folder, while a carbon copy on a buff paper goes to the foreman of the first department which will do work on the job.

2. A material statement (see Figure 42), in quadruplicate, the sections of which are distributed as follows:

(a) To the general stores office, as a notification to provide material.

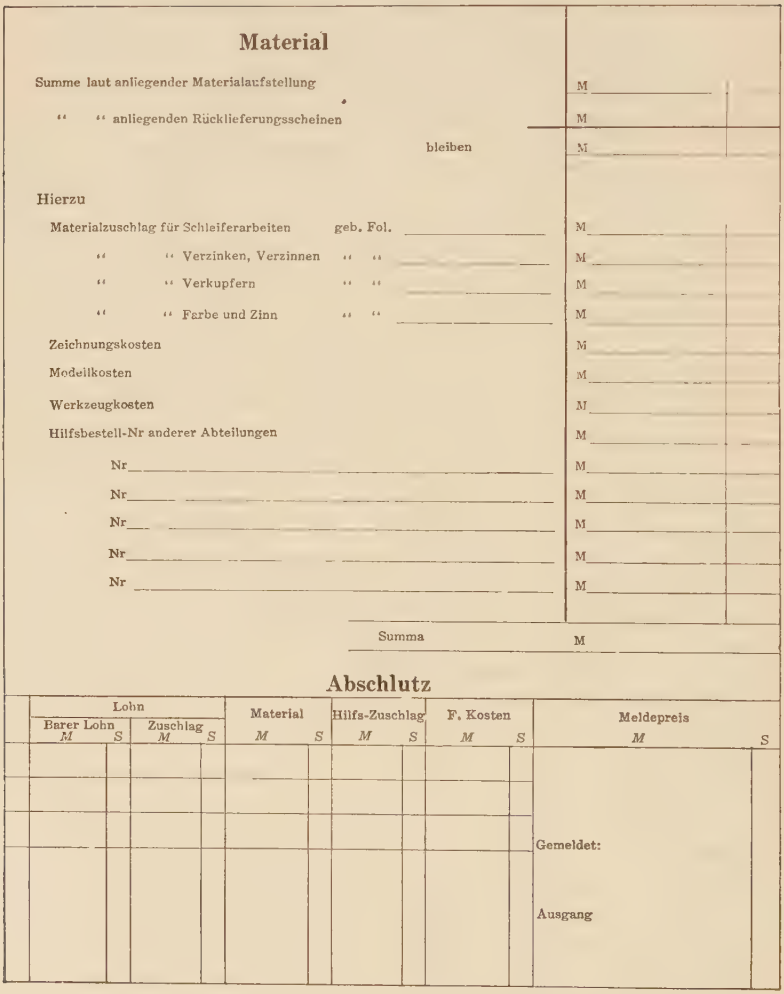
(b) To material stores, as an order to deliver the material to the departmental stockroom.[3]

(c) To the departmental stockroom, to show the clerk what the material is needed for, when it is needed, and by whom.

(d) To the workman—via his foreman—to notify him material is ready for him.

3. A tracer card, which is made out in duplicate, one copy going to the foreman and one to the follow-up department in the general factory office. This is filed to appear eight days before the date the order is due, when a man from the general office goes out into the factory to investigate the state of the order. When the foreman decides that the department is in shape to do the work, taking into consideration the delivery dates demanded by his material statement and the work already on the floor, his clerk issues a work ticket (see Figure 42), which starts the workman on the job. With this work ticket is delivered a blue-print and a list of any special tools required. Workmen are always equipped with the tools they ordinarily need, which they take out in lots of a specified size. In case additional instructions are needed by the workman—which is rather unlikely considering his training and the completeness of the blue-prints—he goes to the foreman for them. In case

[3]Both the general material stores and the stockroom are provided with a complete stores ledger and the stock cards are exchanged weekly and checked by the general stores office. When the material statements are sent to the storeroom, an envelope with tags for each part goes with them. These tags, duly numbered, are attached to the parts as they are issued and control their route through the plant. When the envelope is empty the storekeeper knows that everything is on its way.



Material

Summe laut anliegender Materialaufstellung M

" " anliegenden Rücklieferungsscheinen M

bleiben M

Hierzu

Materialzuschlag für Schleiferarbeiten geb. Fol. M

" " Verzinken, Verzinnen " " M

" " Verkupfern " " M

" " Farbe und Zinn " " M

Zeichnungskosten M

Modellkosten M

Werkzeugkosten M

Hilfsbestell-Nr anderer Abteilungen M

Nr M

Nr M

Nr M

Nr M

Nr M

Summa M

Abschlutz

Lohn				Material		Hilfs-Zuschlag		F. Kosten		Meldepreis	
Barer Lohn		Zuschlag									
M	S	M	S	M	S	M	S	M	S	M	S
										Gemeldet:	
										Ausgang	

Figure 42. Inside of Folder Used to

Sections headed "Material" and "Zusammenstellung für Materialrücklieferungen" are superimposed marked "Material-Aufstellung") and work tickets (sections marked

Zusammenstellung für Materialrucklieferungen

Gutschriften			Materialausschutz			Fabrikationsausschutz		
	M	S		M	S		M	S

Material-Aufstellung **Wf**

für

Datum _____

_____ Bestell-Nr W_____

_____ Blatt-Nr_____

Meister _____ Termin _____

Gewicht kg	Anzahl	Bezeichnung und Dimension	Zeichnungs-Nr	Kub.	Pos.	Modell- oder Bestandteil-Nr	Bezüge Dat.	St.	Gewicht	Einzelpreis	Gesamtsumme
									Transport		

Akkord-Zettel **Mf**

Woche vom	bis	10	Bestell-Nr
Akkord-Nr	Kontroll-Nr	Name des Arbeiters	Meister

Lfd. Nr	Stückzahl	Type	Gegenstand und Art der Bearbeitung	Zeichng. Nr	Pos. Nr	Vorrichtung Nr	Einheitspreis	Gesamtpreis

Akkord-Zettel **Mf**

Woche vom	bis	10	Bestell-Nr
Akkord-Nr	Kontroll-Nr	Name des Arbeiters	Meister

Lfd. Nr	Stückzahl	Type	Gegenstand und Art der Bearbeitung	Zeichng. Nr	Pos. Nr	Vorrichtung Nr	Einheitspreis	Akkord-Basis	Gesamtpreis

Ausgegeben am_____ 10__ _____ Unterschrift des Meisters	Gesamt-Stunden	Gesamt-Betrag
Abnahme am_____ 19__ _____ Unterschrift des Revisors		Akkord-Abschlag

Ohne Akkordzettel darf kein Akkord begonnen werden

Collect Cost Data in a German Factory

printed on the inside of the folder which contains a material statement (section "Akkord-Zettel"). The upper one has a broad blue band across the top.

of any unusual occurrence which makes it impossible to get out the work in the time estimated by the forecalculation department, a special work ticket with a heavy blue line across the top is turned in at the time office after the workman completes the work. (See Figure 42.)

In addition there is an order of work ticket by means of which the foreman notifies the general stores office in what sequence he wants the material for the different jobs to be delivered, an order change ticket, by means of which he notifies the general stores office if a change is necessary in this order, and a reorder ticket, by means of which defective or spoiled material may be replaced. There is also a "short of material notice," which is sent the foreman whenever the material ordered is lacking in the storeroom. This is made out in duplicate and a copy is sent to the purchasing department via the general stores office.

As various parts of the job are completed, the forms covering the work done are returned to the general factory office where they are filed in the folder (see Figure 42). When the forms are all in, the folder is turned over to the Hollerith machine operator, who works out departmental and total labor and material costs, etc., and enters them in the spaces provided for them in the folder, which thus becomes a permanent cost record. The system is simple, and with carefully laid out factories and a well-trained organization results in a high degree of operating efficiency.

Planning and Dispatching in Germany

A large German machine tool plant, quite as carefully organized, laid out, and standardized, possesses rather more of a planning and dispatching system as we know it. Copies of the order and the bill of material are sent to all departments concerned and then a notification card—marked with a delivery date and further classified as to urgency by marking it

in one corner with a large rubber stamp as "immediate," "ordinary speed," or "for stock"—is started as a sort of tracer. This card carries the schedule laid out in the planning department, in which a corresponding order of work chart is maintained showing the progress of the card and the work through the plant. (See Figure 43.)

Each departmental foreman has his own office and is supplied with a clerk to relieve him of details so that he can devote most of his time to the workmen. He is further supplied by the rate-setting department with the time allowed for the work itself, and for setting up the machine—in order to emphasize continually the advisability of machining in as large lots as possible. One copy of the work ticket is forwarded with the work to the inspection department and eventually to the cost department for the purpose of figuring costs, which are kept on each order and on each machine on each order.

The plant is so divided that each type of machine tool is manufactured in a separate department, where the machines are so grouped as to reduce transportation of work in process to the minimum.

At another plant an interesting feature was the issue in duplicate of each work ticket, one copy of which went to the planning department. The move ticket, which followed the job through the shop, was issued with coupons attached which, when the work was started in one department, were detached and sent to the department next following to notify the foreman as to what jobs would reach him next.

Interest in Scientific Management

Scientific management is at present interesting German engineers deeply. There is considerable literature on *Das Taylor System* and I found the staff of the Deutscher Ingenieure much interested in developments in other countries, about which they have known very little since 1914. During her

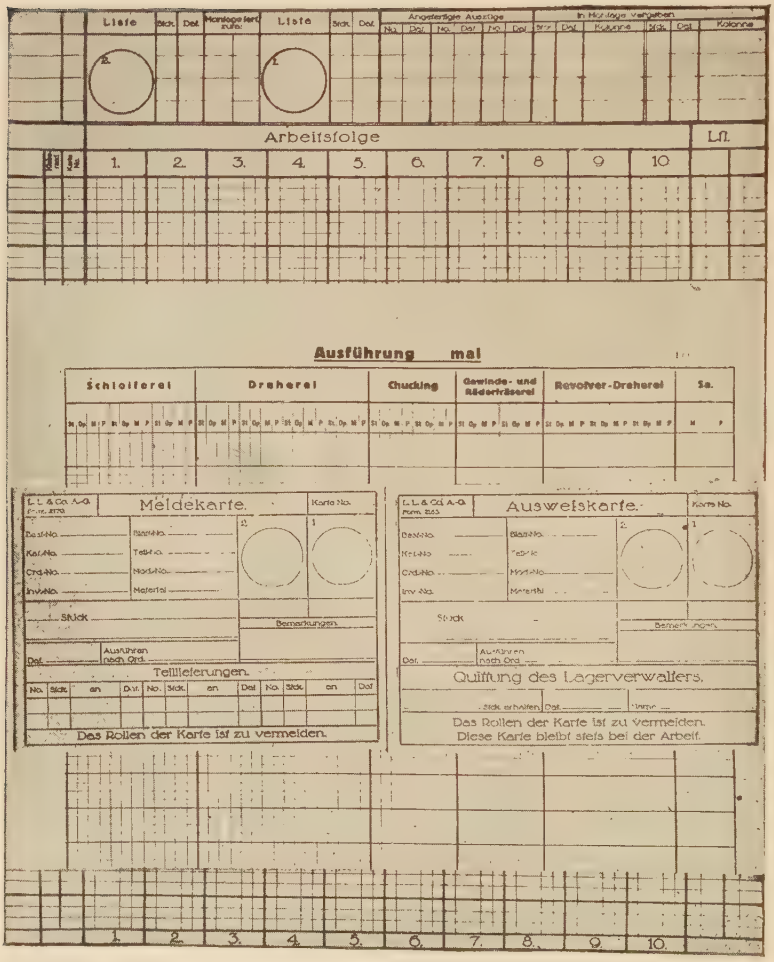


Figure 43. German Notification Cards and Order of Work Chart

period of isolation German industry seems to have developed rather along the line of selecting the man for the job, fitting him to it, and inculcating in him a respect for the organization, along educational lines, and along lines of mass production, rather than along lines of devising control systems with charts, planning boards, and printed forms exactly regulating each step of manufacture. With German workmen their policy certainly produces results.

Italian Methods

In one large Italian plant I found bills of material and work tickets but no signs of scheduling or planning. Inquiry developed the fact that "the inspectors walk around, see what is missing, and report it to the foreman, who orders it." Such a quintessence of casual management is not, however, the rule in Italy.

The chief engineer of one of the largest organizations in Italy told me as we visited several of the company's plants, that they were using scientific management in all their plants—that they received from their New York office all literature issued bearing upon scientific management, and that they had two industrial engineers in charge of the work. Inspection disclosed the fact that, while they were working along the right lines, the installation was still in a very rudimentary state. Some time studies had been made and an embryonic sort of instruction card was set in a frame attached to each machine, but planning boards and like refinements were conspicuous by their absence. Considerable standardization work had, however, been done.

In a large shipbuilding plant I found that they were following the Hog Island system of assembling all the material for each ship before starting the work. The Italians are intensely interested in modern methods and are quick to grasp the value of a new idea. Large factories are so new a development

in Italy, however, that hitherto most of their energy has necessarily been devoted to erecting efficient buildings, securing efficient tools, and working out labor-saving equipment—to the architectural and mechanical features. The next step will be the general replacement of casual by scientific management, to the necessity for which they are already thoroughly awake.

Planning and Dispatching in England

In the average plant in England planning and dispatching is very much as it always has been. This is due to three things —individualism, love of precedent, and suspicion on the part of powerful trade unions. Even in plants of modern construction the system of "visiting around in other departments to find out what the next job will be," is still in effect. One of the most efficient plants I visited, so far as physical equipment was concerned, was still operated under this system. Another more modern in some respects than anything we have in America had what they called a "production man." He had little or no system, but was a sort of king of the "stock-chasers" and was much harassed, I was informed, by the salesman, who insisted on going out into the plant and giving orders to the foreman, which upset any sort of a plan he had attempted to arrange.

In one very large and modern plant, built according to American designs, I was told that the foremen were provided with copies of all orders and then "watched what was coming to them from the previous department." The plant, however, although it manufactured a somewhat diversified product, was laid out for mass production with substations for stock along the route of progress, so that the issuance of the stores requisition when each lot was put "in work" caused the parts required for each stage of the journey to be delivered at the point on the route where they would be used. The speed of progress, however, was regulated only by the delivery date

on the order.[4] Compared with some other British plants I visited, this plant was a marvel of efficiency, even though the speed of progress was not fixed by any sort of mechanism, either of the chain assembly or planning board variety.

There are in England certain pioneers who have consciously installed scientific management and whose plants are marvels of efficiency, which equal, if they do not exceed, anything which has been developed anywhere else. In these plants standardization, planning and dispatching, and the like are so complete that an attempt to report the system in detail would result in a book as large as that of Colonel Babcock on Franklin plant methods for each. I shall therefore describe only the points of unusual interest, allowing the reader to conclude that methods not discussed are in accordance with the best principles of the true science of management.

Dispatch Boards in a Chain Plant

At a plant manufacturing transmission chains of all sorts the dispatch boards located in each department were arranged as shown in Figure 44.

The squares represent pockets holding colored tickets, which indicate the amount of each material "in work" in each section of the department. Thus materials 1, 2, 3, and 4 are required for chain No. 467 and materials 3, 4, 5, 6, and 7 for chain No. 468 and are processed in the department in the order shown by the letters A, B, C, and D. They eventually unite, either to form the finished chain No. 467, or to emerge from the department as a finished unit of such a chain. Sufficient material is delivered to the department to make the quantity of chains ordered. When the materials arrive in

[4]There is a certain parallel between this system and one of the German systems described. The fact must be kept in mind that German workmen are trained to work, to try to see how much they can do, while English workmen have been incited to hatred of their employers for so many years that they do as little work as possible. Furthermore, the trade unions are squarely on record against "payment by results" and individual output records. Inasmuch as most workmen are members of trade unions this automatically kills off any attempt at labor standardization by time study.

the department the quantity of each is written on a card and inserted in the proper material pockets—1, 2, 3, etc. As this material is processed the figures in the material pocket diminish and appear in the pockets of the subsequent operation until each of the operations required in the department has been performed.

The system may be likened to a lot of flow meters along a group of parallel water pipes, indicating the progress of

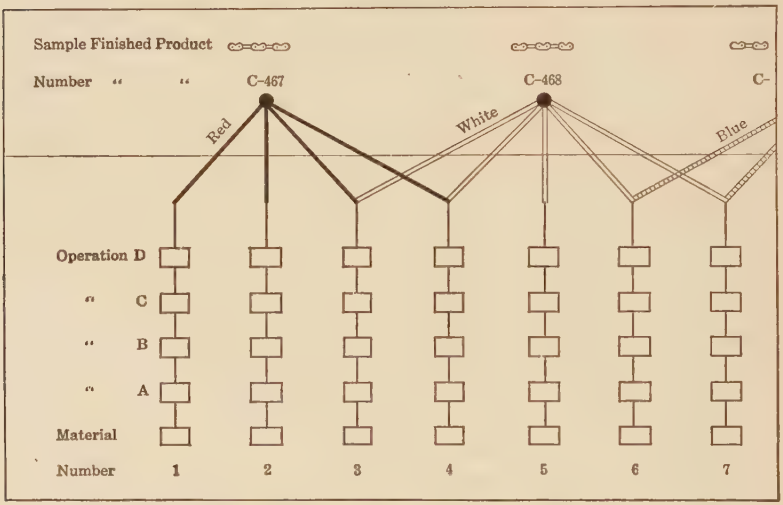


Figure 44. Departmental Dispatch Board in an English Plant

the liquid in each part of each and insuring that the flow at each point is just adequate to fill a bucket (represented by the size of the order) at the other, at the exact moment it is required. The value of the board in regulating production will be evident at once to anyone familiar with the ebb and flow of production streams as the material in process of manufacture passes from machine to machine. As a matter of fact the feed into the material pocket is usually steady, but the principle of the board's action is as described.

Each department, including the general storeroom,[5] is equipped with such a dispatch board. Each board is equipped with a telephone and the status of the board is reported to the statistical office daily and the results assembled directly on a Powers machine. The daily report is important as it saves an enormous amount of clerical work and makes it possible to balance actual accomplishment against the manufacturing program planned for the plants as a whole.

Movement of the material from one department to another is recorded by trucking it past the board. If the path of the trucker does not lie past the board as material is moved from one machine to another, the trucker reports the pieces moved to the man in charge of the board. As a result the board presents a true picture of the actual portion of all material in work in the department at all times as compared to the planned position. The boards, which are 8 or 10 feet high and 20 or 30 feet long, are usually located on aisles and are electrically lighted.

Centralization vs. Control by Foremen

When these boards were first used, some four or five years ago, they were considerably more complicated. The company suffered from "a bad attack of overcentralization," as the director expressed it. The central planning department was at first filled with clerks and an attempt was made to control everything from there. At present the department is more like the office which the industrial engineer establishes in a plant in America—an office doing analytical staff work and lending its assistance to any planning department needing it—rather than a department designed to direct all the details of planning. The departmental boards are in charge of the foreman of the department who has his own dispatch clerk, time-

[5] In this case the operations consisted of placing the order, arrival of the material, etc.

keeper, and inspector.[6] The result of this is that the value of the foreman's experience, the value of the continuous personal contact between workman and foreman, and the value of the foreman's pride in the efficiency of his own organization, are utilized to the utmost. By this means, then, instead of the shelving of the foreman, instead of jealousy and plant politics, and instead of important matters being decided by inexperienced clerks isolated in a central planning department, harmony, efficiency, and low production cost are substituted. It is good management and good psychology.

Dispatch Boards in the Plant

The same type of dispatch boards have been applied to the manufacture of safes (even less of a continuous production and more of a job production manufacturing activity, since each safe comprised some three hundred parts and was manufactured in twenty-seven different varieties) and to various other uses. It is simple and effective and provides absolute control upon a basis of exact knowledge.

In another plant manufacturing a diversified paper product the dispatch boards provided for even more detailed control. The boards were provided with horizontal tin slots. Into these slots—which were perhaps 8 feet long and 2 inches wide, each one of them representing a department, a machine, an operator, or a crew—were slipped cards, 2 inches wide, each one of which represented a job. These job cards—different colors to represent different board classes of work—were ruled vertically and each ruling represented .2 hours, or 12 minutes. When a job was entered on a card the card was cut so that its length represented the standard time allowed for the job.

The divisional boards were equipped with a number of slots, each representing a department. In these departmental

[6]This will be discussed more fully in the chapter on factory organization.

slots the job cards (representing either a customer's order, or an order for stock) were inserted one after another, so that the sum of their length, placed end to end, showed the number of standard hours planned ahead for each department on the board, which was divided into days by lines painted vertically across its face. At the time of my visit work on these boards was being planned about two weeks ahead. The position of the job cards was altered each morning so that the left-hand space between the vertical lines on the board always represented "today" and showed the amount of work ahead for each department.

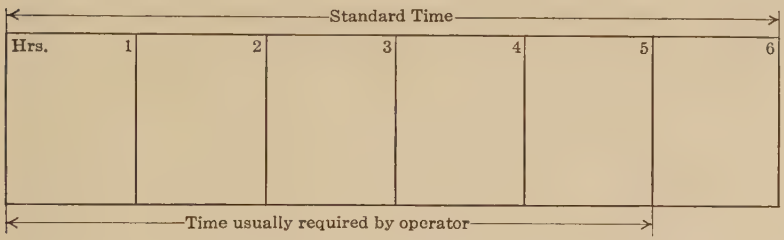


Figure 45. Job Card Inserted in Machine Slots on Departmental Dispatch Boards

Each department was equipped with a similar departmental board where the jobs assigned the department from the divisional board were split up to machines, operators, and crews. On the department boards each horizontal slot represented a machine or a workplace. Into such machine slots, job cards (Figure 45) were inserted, corrected on a basis of each operator's past efficiency.

These cards were then lapped one over the other in the machine slots, so that the total overall length of all job tickets inserted in the machine slot represented the actual time which would in all probability be consumed in completing the jobs scheduled ahead to each machine. As each job was completed the actual time consumed was marked on the job ticket, which was used in the time office and then became a permanent record.

Factory Order and Job Cards

Full information in regard to the job is entered on a special factory order card. From this the job card used on the divisional board is made out. The factory order card, which is colored to correspond with the color of the job card, goes to the departmental board, where it is filed in a rack in front of the board in accordance with the date the order is required by the customer. As soon as the job is entered on a job card and placed on the departmental board, the factory order card is filed in a regular card index box according to order number and remains there until the job is completed. From this factory order card information of various sorts—such as the percentage of promises to customers fulfilled and like statistical data—are compiled and entered on charts.[7]

When the job card on the departmental board indicates that a machine will be out of work shortly, exactly the amount of material the job calls for is delivered to the operator, who must deliver the full amount of finished product or explain the cause of spoilage; in the latter case the reasons are recorded for statistical analysis.

Other Installations of Scientific Management

These are not the only plants in England in which scientific management has been installed. There are also a number of plants in which the work is in the installation stage. In one plant standardization reduced over 1,200 sorts of containers to less than 350. Standardization and planning increased the output of the factory over 70 per cent. In another an Elliott-Fisher tabulating machine had been arranged to fill in planning sheets with one impression in such a way that each department foreman was informed as to what had transpired in the previous department as well as what was planned for him. The stores requisitions were made with the

[7]See subsequent chapter on statistical control.

same impression on small detachable tickets, one set of which went to stores and the other to the manufacturing department.

Another plant was using a tag system of dispatching similar to that used in some of the more ably managed factories in America making gloves, clothing, etc. The tag, marked with a serial number, accompanies the article and regulates its speed of progress, being checked off at each station (department or operator) against a typed list of "trains due." The tag is in some cases accompanied by a copy of the invoice to the customer, which accumulates the cost of each operation and eventually becomes a part of the permanent cost record. Another copy made out at the same time announces the receipt of the order to the shipping department. The original goes to the customer after shipment is made. Dispatching under this system is sometimes aided by the adoption of certain colored tags attached to indicate the date the work in each department is to be done. For example, a foreman finding a blue Monday tag on his department on Tuesday, when all tags were scheduled to be pink, would give the garment special attention.

It would be easy to go on indefinitely with an account of planning and dispatching methods in use at home and abroad. We believe we have given enough, however, to indicate in a general way the state of this phase of industrial management. We have attempted to supply full enough detail in the case of the more marked variations from American practice to enable the administrator to grasp their fundamental significance and the engineer of experience in manufacturing to utilize the principles of the mechanism in building up the efficiency of industry.

CHAPTER XI

RATE-SETTING AND INCENTIVES

Fair Work for Fair Pay

"A fair day's pay for a fair day's work"—for once the slogan suits employer, employee, union official, social uplifter, and industrial engineer. All agree and harmony reigns until some practical person asks for "interpretations."

As a matter of fact—in order to avoid just such explosions in industrial conferences—the United States Department of Labor has been trying for some years to determine what constitutes a fair day's pay. To that end its representatives have haunted the housewife from Kennebunkport to San Luis Obispo and have sought to ascertain statistically the habits and the expenditure of the working man—from the cost of his penchant for lurid mental pabulum to his outlay for beans.

While progress of a general nature has been made, a careful analysis of the results of the investigation can lead only to the inevitable conclusion that the standard of living, like the standard of manners, depends upon geography, climate, and heredity.

The fair day's work has proved even more elusive. Unfortunately this has also been regulated principally by the laws of supply and demand operating in the labor market. A working man's conception of a fair day's work after he has been out of a job for six weeks and his family is half-starved, is entirely different from his idea as to the amount of work he should deliver when every employer in the country is bidding furiously for his services. Furthermore, the man who is afraid some commodity will spoil on his hands can demand neither the conditions nor the price as can the man who possesses a

partial monopoly in something the world must have or perish. Until labor can be put in cold storage—like eggs—against the time when the demand increases, the laboring man will encounter periods when he must sell his services cheap. At present the only way he can emulate the egg profiteer and hold out for a better price for his services is by the practice of thrift, and unfortunately, though quite humanly, he is inclined to prefer silk shirts on the back to Liberty bonds in safe-deposit.

Economic Aspects

While such a condition is manifestly unfair, the search for a remedy should not be dismissed on the ground that this regrettable situation is a law of nature and therefore irresistible. Not only is it unfair to put the working man in the position of the fear-driven animal and unwholesome for the employer to regard himself as a castigator in the hand of Providence, but it is also uneconomical and unprofitable to the industry and to the community.

Not very long ago the garment industries used to shut down at certain seasons to the serious loss of the manufacturer as well as to the workman. Normal production was represented on the chart by a series of peaks and valleys. The peak represented large profits and overwork and the valleys loss to employer and to employee alike. Similarly a series of peaks and valleys which represent a large amount of soldiering when the employer needs production and fear-haunted strenuousness, when the employee is afraid of being thrown into the street, promotes neither harmony, mutual respect, profitable production, nor low-commodity cost to the community.

A Proficiency Scale of Wages

Not very long ago an employer of some thousands—a man who as a union official had once won labor's battles—

described to me his system of paying his workmen. Careful records were kept of each man's daily output. The workmen were classified according to proficiency and quality and quantity produced—and standard rates of pay were established for each class. A man who fell behind his class was given sympathetic personal attention from the plant executives. Then, if within a month he did not measure up to his class again, he was dropped into the class below.

At first glance this seemed an ideal arrangement. Each man was paid in proportion to what he accomplished, which was fair to the conscientious workman, since he received a greater reward than the loafer. Sympathetic assistance automatically became his when he encountered hard luck, so that he was not penalized if the fault was not his own—if it were due to unsatisfactory material, a machine in poor order, or lack of tools and accessories. If he needed change of work, medical assistance, or common-sense advice, he got it, since his case became the problem of the higher executives and their staff advisers if the foremen could not straighten out his trouble. He knew exactly what would happen to him under any circumstances which were likely to occur, so that his prosperity did not depend upon the whims of some straw-boss. He was as nearly as might be his own master, since he knew the quality and quantity of product requisite to success quite as exactly as did the custom-shoemaker so often pointed out as the ideal contented craftsman of the industrial day which has vanished.

But when my friend was asked how his firm knew what constituted the quantity and quality of work which a workman should produce in order to place him in the highest class, he had to admit that standards were set partly from a perusal of old records and partly according to the judgment of the various foremen. Nothing had ever been done to determine just what constituted a fair day's work.

Lack of Individual Production Standards

Another man, head of a great industry whose business ideals—in spite of the fact that they seem to smack of the millennium to the usual "hard-headed American business man"—have been applied to his labor problems so practically and with so sure a touch that his cost of production remained almost stationary during the war, and his labor turnover last year stayed at less than a fourth of that obtaining in the greatest and most advertised welfare experiment of the decade—told me that in his plant the scientific setting of standards of individual production was still a year off. Production throughout the plant was dependent upon the good-will and loyalty of his help. While the shop spirit was marvelous, not only was the shirker profiting at the expense of the conscientious workman but the workman's method of forcing shop improvements and eliminating delays in manufacture was weak and ineffective, since it depended upon his ability to convince his foreman and that foreman to convince his superiors.

All were good and conscientious men, perhaps, but unskilled in analysis, in the marshaling of facts, and in the presentation of a convincing written argument to the management. Wonderful as the plant was, the fair day's work was an unweighed, unmeasured unit and if a man was skilled in appearing busy or if he wore himself out galloping about an illy adjusted machine, he might receive the same rate as the man who was quietly efficient in his own work and in the adjustment of his machine.

Both these examples illustrate what is occurring in the most highly and intelligently organized and operated shops in America—the home of enterprise and efficiency. What then is happening in the majority of shops—in the shops which, like Topsy, "just grew," during the years in which our great corporations were born and attained manhood?

Personal Contacts in Former Times

During the last two years the advertising columns of our newspapers have carried the illustrated life story of a man still living—of a man who as a six-year old boy was apprenticed to a relative to learn a trade. In the last scene of this series he is carrying his raw material to his own factory in the evening, he is cutting up this material himself for his three assistants, and he is working with them in fashioning this material into the finished product. Under such conditions any workman who doesn't do a fair day's work hears about it long before the day's end. If he doesn't take a brace his wife is likely to hear about it that evening. On the other hand the boss learns at once of any interference with production. Industrial problems—whether of quality and output or whether social and economic—are met by employer and employee shoulder to shoulder. With such personal contact the fair day's pay and the fair day's work are determined as equally, as completely, and as harmoniously as is possible between human beings whose interests differ, but whose contact is so continuous and so intimate that a dirty trick on the part of either would probably result in a bloody nose for the perpetrator, be he employer or employee, as well as in complete loss of the respect and of the position accorded him in the community.

Bridging the Present Gulf

In the industrial cycle which now exists, we have to bridge the gulf between the "dirty wop" who walks into the western factory in the dark at 6:30 in the morning—one of 20,000 known by a number—and the carefully manicured "chairman of the board" who steps from his limousine into a mahogany-paneled drawing-room in an elegant building at 10:30. Building and maintaining this bridge is the work of the industrial engineer—be he executive, educator, or consultant. It's not

a case for oratory, for invective, for stirring up class hatred, or for damning the world as an entity, but for action based upon *facts*.

We do not purpose to discuss how much money a man must receive to be contented, since contentment is a matter of imagination and temperament, as anyone can prove to his own satisfaction by sitting on a park bench any pleasant Sunday and comparing the expression on the faces of those who go by in Fords with those who go by in limousines. Neither do we intend to argue from a moral standpoint the question of the exact share of the profits due to labor and due to capital —provided there are any profits. Such matters are interestingly discussed by enthusiasts unhampered by experience or by facts and are eventually decided firmly and irresistibly by economic law. On the other hand the consideration of the best methods of determining a fair day's work and of rewarding the workers fairly is an engineering problem. Upon its solution depends the success of bridging the gulf which has arisen between the owner and the workman. For when all is said and done the most sensitive points of contact between master and man are wages and personal treatment. Welfare work and low wages don't go with the workman any more than do current wages and a raw deal. He saves his loyalty for the place where he gets both good wages and decent treatment. We can only reproduce the harmony and efficiency of the bygone era by the use of methods which insure quite as quick a reaction from the boss when good work is done or when difficulties are encountered by the workman, as were possible when the boss worked shoulder to shoulder with his three helpers.

Stockholders and Scientific Management

The man who really controls the industry of the present day holds his power on sufferance from a mass of stockholders

interested almost exclusively in the size and frequency of the dividends that "the property"—which to them means principally the assets in the form of real estate, buildings, and machinery—can be made to earn. "Organization," "efficiency of operation," and "loyalty of personnel" are meaningless terms to the usual stockholder, who sums such things up under the vague term of "good management." One reason why scientific management has made such slow progress has been due to lack of sympathy on the part of stockholders with expenditure for any asset that is non-mortgageable. Another thing that has hampered the development of the most effective management is the total lack of realization upon the part of stockholders and directors that high-priced executives and high-priced workmen are not only cheapest in the end but are absolutely indespensable if maximum profits are to be maintained.

Incompetent management—which has been blamed by our more skilled industrial analysts for most of our late industrial ills—is usually the result of narrowness and lack of education on the part of the stockholders. In order to secure reforms it is just as necessary to educate an incompetent manager's constituency as it is to educate an incompetent senator's constituency under similar circumstances. That is why it is the duty of the men who know—of earnest idealists of actual industrial experience—to take advantage of every opportunity to impress upon the public the conditions which actually exist, if unwholesome and selfish propaganda is to be defeated in its attempt to refashion industry to suit its own fads and its own nefarious ends. We are an industrial nation and the personal prosperity of each of us depends upon the effective management of our large industrial units. Therefore the burden of spreading the true word rests upon each skilled and far-seeing industrialist, be he executive, engineer, or educator.

The Day-Wage System

As industry grew up from the four-man shop it continued to pay its help by the day. This worked very well in the early cycle of industry, while the owner continued to work shoulder to shoulder with his men. As industry grew the day-wage method was retained because it made accounting easy. Men could be herded through a gate presided over by a gimlet-eyed time-keeper reinforced with a battery of time-clocks, and the stockholders had positive assurance that each numbered workman spent ten hours within the fence when the annual audit had been made by the public accountant. Where a fence was too expensive, periodic descents upon the working crews during the morning and afternoon by a similar gimlet-eyed time-keeper armed with a large book in which he solemnly checked as present each man whom he could see, or whom he suspected was present, furnished an equally auditable record of each workman's presence within the precincts of the industry.

Many years ago it fell to my lot to compile such a time record daily. After about three trips through the works hunting an invisible man, the assurance from a foreman or from a fellow-workman that the missing Bill Spivens had been seen about the factory that morning was sufficient evidence for me to certify that he was working honestly, efficiently, and continuously, and therefore was entitled to pay for such service. Interviews with some dozens of time-keepers since have convinced me that I was unusually conscientious.

Some years later a careful survey lasting a week, during which a trained engineer made a round of a group of shops every twenty minutes disclosed the fact that 20 per cent of the men carried on the pay-roll and carefully "checked in" every morning and out every night, never could be found. At first we thought that someone was benefiting from a padded pay-roll, but further investigation ultimately convinced us that

this 20 per cent simply represented the men wandering from place to place, getting a drink, enjoying a smoke in the wash-room, or engaged in some other non-productive activity. Men on night work in a large shipyard had this sort of thing so thoroughly organized that certain men were delegated to watch for the approach of those in authority, and others assigned to making a noise like men working, pounded lustily on the hull of the ship under repair, while the majority played cards and passed the beer.

While such may be exceptional cases, the fact remains that the most expert and conscientious foreman can be in only one place at a time, and if he has ten crews at work in ten different places the chances are just ten to one that under the day-wage system the men under him will win in the grim game of "take it easy while the boss isn't looking." The only excuse for the day-wage system is easy bookkeeping. As a method of measuring time spent in the works it is eminently successful. If the idea is to measure time served there is no criticism.

Supervision Under Day-Wage System

When the workman-owner retired to a private office in the corner of the shop he made his best workman a foreman. As the business grew he appointed from the better of his employees general foremen, shop superintendents, general superintendents, work managers, resident managers, general managers, and eventually fetched up, himself, in New York as chairman of the board. Supervision of the workmen was left to the lowest class of foremen. For obvious reasons men of the caliber of the owner have not stayed in the foreman class. That is one reason why when men of education brought their attention to bear collectively upon the foreman problem early in the war the first result was wholesale abuse of the foremen as the "petty czars of industry."

Be that as it may, the supervision of the men working under

the day-wage system was left to the most poorly equipped of all the industrial executives. Under this system, besides, since the foreman can spend on an average only about 6 minutes out of every hour with each of his ten crews of men, each crew can do very much as it pleases during the other 54 minutes out of each hour. And, being human, each crew does as little

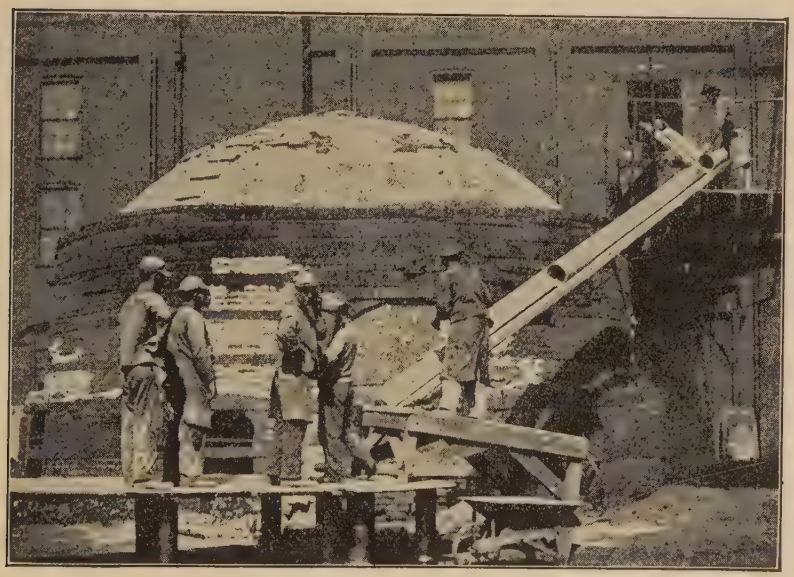


Figure 46. Unstandardized Piece Work

The difficulty is due to the fact that there is no "reservoir from which to take work." As a result four men are standing idle waiting for pipe to come down the slide. Two men are working. Result 33 per cent efficiency.

work as possible and keeps a weather eye out for the foreman. The foreman, having been a workman himself, knows all about this and devises unexpected courses of approach and seeks points of vantage from which he can spot the loafers.

Evils of the System

Under the day-wage system the one weapon of the foreman is fear. When he is criticized for high cost of produc-

tion or because the general manager in his majestic progress through the works has discovered a loafer, his only recourse is to speed up on his footwork, to roar at his men in a more terrifying key, and to fire a man here and there picked from the mass.

Under day work the relation between employer and employee becomes a grim game. The employer says, "I'll pay you so much a day—for 10, 9, or 8 hours of your time. I'm going to get all the work I can out of you in that time. If you can loaf without my catching you, you win. If I catch you loafing you lose—your job." Which wins—with the odds ten to one against the foreman? But the worst of this game is its unfairness. The lazy loafer gets just as much pay as the hard worker. A premium is placed on laziness. The best bluffer rather than the most effective worker wins.

The foreman becomes a jailer. He goes roaring through the plant trying to scare the men into working. He unjustly accuses men of loafing. After a little the workman hates the foreman. He hates the employer whom the foreman represents. He becomes fertile ground for the seed of communism. It's not the foreman's fault. He hasn't been taught any better way. The employer is really to blame, although he has probably been so busy trying to keep his head above water under such methods, and trying to beat his competitors in a world market of increasing complication that he hasn't given the matter attention, and hasn't found out that better methods have been invented.

Piece Work—Rate-Setting by Bargaining

To get away from this sort of thing piece work was invented. The theory of piece work is excellent. The employer is to pay in proportion to the work done. No supervision except inspection for quality is required. The hard worker will be rewarded and the loafer will eliminate himself by starv-

ing to death. The worker will invent new methods of work in order to make more money and for the same reason he will keep his machine and tools in the best possible order.

Unfortunately the ordinary type of piece work breaks down in actual practice owing to the difficulty of setting piece rates. The rate set is usually the result of a bargain between the employer—represented by a foreman—and the employee. The boss wants the rate low, the workman wants it high. The man wants to earn big wages with little effort. Furthermore he wants to protect himself against loss of output due to machine breakdowns, power shutdowns, lack of material, lack of proper tools, and lack of clear instructions. Furthermore he doesn't want to work himself or his friend out of a job.

If the workman makes a good bargain and is foolish enough to let himself out to full speed he is likely to earn about double the average shop rate. The reason for this is that the foreman's idea of how much is to be turned out is usually based upon what he himself used to do in the dim past when he was a workman, or upon what he has observed some other workman do—said workman being a "wise guy" who knows the boss is watching him. The inevitable result, if the workman is innocent enough to let himself out, is that the foreman is sore because: (1) he is afraid that Jones's big pay will make Brown jealous, (2) he is afraid Jones will make so much money he won't work more than two-thirds of the time, and, principally, (3) he knows from past experience that he himself will get the devil as a poor rate-setter from the works manager to whom the inevitable jealous time-keeper has carried the story of Jones's big killing.

Cutting the Rate

Therefore *he cuts the rate.* As a result Jones has to work just as hard as he did in the first flush of his innocent spurt in order to make barely enough to live on and his friends comfort

him with—"Ya poor fish! Ya oughta' known better than to give a good thing away!"

This is not an exaggeration. A woman I knew invented a hammer with which she could drive a nail into a packing case at a single blow. She could have made three times the average daily income under the prevailing piece rate. She told me she did not dare make more than 10 per cent above prevailing rates. In another plant where I was working, a man at a lathe sold to his successor for $17 the completed pieces he had hidden under a bench, which he had finished but did not dare turn in. In the same plant a workman one day invaded the rate-setting department with the astounding assertion that his rate was too high—that it should have been 3 cents per piece instead of 12½ cents—"and the reason I'm tellin' ya, is because I'm quitten' tonight, and I got it in for the fella' who's followin' me on the job!" The rate was cut by the antediluvian relic who presided over the rate-setting department and the "fella' who followed" made about $7 a day!

The result of rate-setting by bargaining and rate-cutting to conceal the poor guess can only be hypocrisy, distrust, and mutual dislike between employer and employee, ending in labor unrest and in strikes.

Bonus Plans

To get away from the evils of the poor guess as to what constitutes a fair day's work, certain bonus plans were devised which split the surplus, over and above the current earnings, between employer and employee. The idea of these schemes was to reduce the incentive on the part of the employer to cut the rate. At the same time the theory was humanely advanced that the employee would not work harder than was really good for him if he received only half-pay for his extra effort or for his extra inventiveness. Unfortunately for the complete success of such schemes the American workman—who has the

most highly developed code of what constitutes a fair deal of any class in the world—cannot see the reason why, if he does twice as much work, he should not receive twice as much pay. Furthermore, under such schemes the workman must largely fight through his innovations alone, and he is primarily a workman not a fighting man.

Figure 47. Type of Men Working Under a Bonus System Based on Quality of Product, Man-Hours Expended, and Coal Saved

They used technical instruments and recorded the results obtained on the charts provided. In spite of what would ordinarily be termed a "complicated" system, they accomplished exactly what was asked of them and earned from 20 to 30 per cent more than men working under unstandardized conditions.

Rate-Setting by Scientific Analysis

Then came the great innovation—the exact predetermination of the fair day's work by means of a scientific analysis of all the elements that enter into and limit the production of a given quality of goods from a given material under existing or attainable methods of manufacture. We do not propose to enter into a discussion of the methods used in applying the scientific method to the determination of the fair day's work.

That has been fully and ably covered in the works of Frederick W. Taylor, H. L. Gantt, Frank Gilbreth, Harrington Emerson, and of the men who followed their lead. For our purpose it is sufficient to state that the amount of work a man should do under given conditions can be and is daily being determined in the largest and most effectively run plants in America, England, and France. The best argument against scepticism is the *fait accompli*. If you don't believe it go and see it done!

Such analysis is made most commonly by means of the stop-watch, which is simply a mechanism for the convenient collection of facts. On certain sorts of work an analytical study can be made without the stop-watch. But it must be made by a trained observer working on the job—not by averaging past records, from data half-recollected by a former workman, or by the casual and untrained observation of a foreman. Furthermore it must be made impersonally—from the standpoint of a disinterested party. Bias on the part of a time-study man is as unthinkable and as destructive of results as bias would be upon the part of a chemist. He is simply a collector of facts.

Opposition to Stop-Watch

The mistake made by those misguided individuals who herald the stop-watch as the bludgeon of the capitalistic monster, used only to drive the exhausted wage slave to one further gasping spurt before he drops in his chains, is that they assume that it is as irresistible as a 44 automatic in the hands of one of the masked gentleman occasionally encountered on the dark side of the street in our large cities and that it can be and is used in exactly the same way. Nothing is more ridiculous. Pointing out a watering-trough to a horse and inducing him to drink are entirely different matters. Under such circumstances the horse and the working man act when they feel it is to their advantage to do so—not before. Co-

operation and trust are just as essential in one case as in the other.

Of course, if a man is a communist, if he believes that the present social order must be destroyed and built up anew, if he believes that society must be Bolshevized, he prefers that nothing which will assist industry to exist as at present organized must be countenanced. If he believes that labor and capital are necessarily at war in all things and will continue to be so long as they shall survive, he wages war at every opportunity against methods which tend to increase the operating efficiency of industry.

For instance, a member of the Fabian Society in England stated at Oxford:

> There should be no "efficiency" system unless there is a really strong intelligent control by the workers in the workshop. I do not think the relations of labour and capital will be improved after the war, and I hope they will not, because I believe in the class struggle and regard their interests as irreconcilable. Any system which supposes co-operation between capital and labour will break down.

Justification of the Stop-Watch

On the other hand, Secretary of Labor Wilson, in 1918, after stating that he believed in organized labor, analyzed the matter of production as follows:

> Labor and capital have a mutual interest in securing the largest possible production with a given amount of labor, having due regard for the health, the safety, and the property, and for the enjoyment of the workers themselves. If we produce nothing, there can be nothing to divide. If we produce a large amount there is just that much more to divide. And the interests of the employer and the employee diverge only when it comes to the point of the distribution of that which has been produced; and if they are wise business men instead of resorting to strikes and lock-outs, and thereby limiting production, they will sit down around the

council table and work the problem out on as nearly a correct mathematical basis as the circumstances surrounding the industry will permit.

This to my mind is the saner viewpoint. One of the most significant points in Secretary Wilson's statement is his plea for solution based upon an analytical and unbiased examination of the facts in each case.

Figure 48. Standardized Bonus Work

The men are free to let themselves out. No ennui here.

How are you going to examine the facts and work out the problem upon "a correct mathematical basis" if you don't collect these facts? If you are going to collect facts why scorn the best means yet invented for collecting the facts about which most industrial controversy centers—the analytical time study? It is absolutely inconsistent to state that it is perfectly proper to ascertain a fair day's work and then turn around and pass laws forbidding the use of the most accurate mechanisms yet devised to determine the amount of work that may fairly be expected from a normal man without injury to his health.

It would be quite as consistent to tell a man you will give

him an indefinite "bunch of money" for his day's work and then expect him to be pleased with what you feel like passing out to him on pay night. Why should it be fair for the workman to deliver an indeterminate "bunch of work" for exactly measured money, while it would be considered most unfair for the employer to pay for an exact amount of work with an indeterminate "bunch of money"? There is just as good reason for having the amount of work accurately measured and known beforehand to both parties to the agreement as there is in having the amount of money accurately measured and known beforehand.

Individual Viewpoints

If a man rushes into print with an attack upon the analytical time study, it is generally safe to assume either that he has never actually worked in a factory, or that he is communistic, or that he is courting popularity from some special constituency which he feels is opposed to any method tending to promote mutual harmony and understanding between employer and employee. If I were a politician and believed that the American working man was inherently a loafer and that the only way I could hold my job was to pander to his baser instincts, I should shout for everything that would promote the delivery of the least amount of work in the working day. . If I were a Bolshevist who believed that the present form of industrial civilization should be wrecked in the shortest possible time for the good of humanity, I should cheer every aid to systematic soldiering, and I would attack every aid to production at every opportunity. If my bread and butter depended upon the fomentation of industrial strife I should fight to the bitter end every method and every mechanism which tended accurately to determine the fair day's work, and which would thus place workmen on an equality with each other and tend to release labor from fear of the boss.

But such is not the position of enlightened employers or of enlightened employees—organized and unorganized. The fair day's work is being determined accurately and scientifically in industries of all sorts, in closed shops, open shops, unorganized shops, and under industrial democracy. Union shop committees are holding the stop-watch and are placing their O K on standard production times. When the duly elected representatives of the workmen pass upon the fairness of a standard fair day's work—when they themselves hold the stop-watch and even in some cases voluntarily propose an increase in the standard performance—what further evidence can be desired as to the inherent rightness of the principle of arriving at the fair day's work by the most accurate means available?[1]

A Statement by Samuel Gompers

Samuel Gompers, President of the American Federation of Labor, in a very remarkable article in *System* (April, 1920) says:

> Having fixed upon the minimum amount of work we are to take into account that all men are not equal, and there is no suspicion in the union doctrine that all men are equal in ability and *I should therefore arrange to pay my people in proportion to the amount of work they did above standard* —not at all in the way of a "bonus," not as a gift, and not charitably, but with a mutual recognition of the fact that if prices are calculated on the man doing 10 articles per day, if he then does 20 articles a day the employer can well afford to pay the worker who produces 100% more, 100% more wages, because the overhead expense remains just the same. *This is a principle recognized by most industrial engineers and it is perfectly fair to all parties.*
>
> There is an impression that the unions are against machinery, are against the better ways of doing business, are against scientific management, and in favor of stringing out

[1] In the garment industry in Cleveland industrial engineers were hired jointly by the union and by the employers in 1919 to determine exactly what constituted a fair day's work.

every job to the greatest possible extent. That, it is true, was the attitude of the old country. It is not the attitude of the American Labor Movement.

"Speeding Up the Worker"

Academic attacks upon rate-setting by analytical methods are usually due to ignorance of modern industrial shop conditions. The parlor Bolshevist or the uplifter, never having done any manual labor except such chores as have been done about the house or on a camping trip, resulting in blisters and backache, imagines that all factory work is performed by main strength and awkwardness and consists of heavy lifting, pulling and pushing.

As a matter of fact, only a very small proportion of modern factory work is at the same time heavy and fast. With the development of machinery, quickness and dexterity have been more and more required. Heavy work is almost entirely done by machinery, the operative merely turning off and on the power, guiding the material, or preventing something going wrong with the machine. About the last thing an analytical time study does is to "speed up the worker" in the sense in which that overworked phrase is usually employed. It is more likely to be the management that is jolted when the analytical study is finished.

To illustrate what I mean—some years ago some engineers associated with me ran a lot of analytical time studies in order to test the general efficiency of operation of certain departments in an automobile plant. Of a dozen such studies selected at random from my notes only one example of inefficiency brought to light required quicker work on the part of the operatives. This was one which showed output being delayed by slow and inefficient trucking. There was one case of lack of material to complete an order which had been started, making it necessary to change the job and the set up of the ma-

chine. In other cases output was lost by wrong machine adjustment, by improper gauging, by the improper placing of raw material, or of trucks, or of machines. Congestion of material interfered with output. Unnecessary handling was being done by operators. High-priced operators were stopping their machines in order to clear away scrap which should have been taken away by low-grade laborers. Machine operators were even doing their own trucking while their machines stood idle.

Responsibilities of Management

Who was responsible for improperly planned trucking or an improperly manned truck—the machine operators who possessed no authority whatsoever, or the plant management? Who was responsible for the poor material control system—the men or the management? Who was responsible for high-priced men having to stop the machines and do low-grade work—labor or capital?

In the face of such disclosures as this, whose duty was it to get busy and "speed up"? Was it the duty of the men or the management?

Harrington Emerson once told me that an examination of some 40,000 records of workers whose efficiency rose on an average of 70 points disclosed the fact that 50 of the points were secured by the betterment of conditions, and the other 20 points by the improvement of individual methods. These results, he said, were gained not by the speeding up of workmen, but by the *improvement* of methods—better tools, instruction in better methods of work, and the like. My own experience leads me to believe that this was a very conservative statement. *Analytical time studies are much more likely to show up the management than the men.*

We have already discussed in previous chapters the necessity for standardization, systematic planning, dispatching, and

the like. The point we wish to make here is that such aids must be given the men by the management before the men can be expected to do a fair day's work.

We must remember that there is nothing so discouraging as to make an intense effort to accomplish something and then —through no fault of one's own—to have such effort come to naught. It is the duty of the shop management so to standardize conditions that the workman is given a fair opportunity to earn the extra money offered for extra effort. How can the workman be expected to give special attention to the quality of his output if, after a morning spent in closely watching the product, taking every pains to maintain the standards of quality desired, by afternoon raw material is delivered to him of such quality that he loses all he gained by his extra effort in the morning? Or how can a workman be expected to jump into quantity production with zest the day after his extra effort to make a good showing came to naught because his machine broke down? When we buy oil stock or take a flyer in real estate we try to be good sports when we lose. When we buy Liberty bonds we emit a terrible howl if we lose either principal or interest. Similarly the workman is willing to take his chance in a raffle, but when he delivers honest effort, he feels swindled if his reward is lost to him through the intervention of something beyond his control—such as defective raw material or a poorly repaired machine.

Standardization vs. Choice of System

A great deal of good print-paper and many pedagogical man-hours have been expended in discussion of the exact type of bonus system best fitted to deal out to the workman the extra money for his extra effort—to reward him for the extra attention he devotes to following instructions in order to maintain standard output and quality. There is something about the graphs illustrating the Day-Work, the Straight Piece

Work, the Rowan, the Halsey, the Taylor, the Gantt, the Emerson, and similar systems of payment which seems to fascinate the cloistered casuist. He can retire to his study, lock the door, turn on the green lamp, and then draw curves and discourse learnedly upon the relative fairness to the working man of each system, without fear of interruption or contra-

Figure 49. Another Example of Unstandardized Piece Work

The difficulty here is that there is no "reservoir in which to put work." The dumping place—at the end of a single plank—was occupied by a third man. Therefore these two men could not get rid of their loads. Result 33 per cent efficiency.

diction, until he has proved to his own satisfaction exactly which one will produce the exact form and quantity of reward most likely to produce a feeling of content in the mind of the working man—as he imagines him.

As a matter of fact, it does not greatly matter which system is used—*provided* enough standardization work has been done to insure the workman being paid in proportion to the effort he expends, provided the amount and quality of work to be done per hour is set only after a sufficiently careful analytical time study has been made to determine how much of the par-

ticular type of work a normal operator can do year in and year out, without injury to himself, and provided the workman is guaranteed a fair remuneration in case of serious interruption in output by factors beyond his control.

Each system has its advantages. There are some jobs which must be paid for by day work, although there are very few—much fewer than is commonly supposed—for which some form of reward for honesty, loyalty, and efficiency cannot be devised.

Some Features of Piece-Work Systems

Standardized piece work is probably the simplest for everyone concerned to understand. Its fairness depends upon the accuracy with which the quantity and quality output per hour has been determined. The Rowan and Halsey plans work very well if the burden of standardization of working conditions and the analytical determination of what constitutes a day's work are assumed by the management. The Taylor differential piece-rate system emphasizes the attainment of the predetermined day's work by paying a higher rate per piece if the standard is attained. The Gantt system puts a similar emphasis upon the attainment of the standard set but protects the worker against loss by guaranteeing him a certain minimum daily income.

The Emerson system is less severe inasmuch as it not only guarantees the daily income but begins to reward the workman for extra effort expended before the full standard is attained. Some curves have been criticized because once the standard is reached the payment per piece produced begins to decrease, the critics holding that the employer can afford to pay full piece-work price regardless of how high production soars since he reduces his total cost of production, because of the division of the constant overhead charges, by the greater number of pieces produced. Engineers who have actually installed these

bonus systems know that there are certain sorts of work—pure physical speed jobs—where it is humane to discourage the hourly production beyond a certain point. Under such circumstances a reduction in the piece rate when more than a certain number of pieces are produced tends to discourage the type of man who doesn't care what he does to himself so long as he increases the thickness of his pay envelope.

It has been found necessary in some cases where the differential piece-rate type of system has been installed to make what are called "high" and "low" premium rates. For instance, under the original system a man making boxes would be paid 10 cents apiece for them if he makes the predetermined standard of 50 per day, but only 5 cents apiece if he makes less than 50 per day. In order to encourage him not to slump back to 20 a day if he sees he is not going to be able to make the full standard of 50—and so perhaps upset carefully laid plans and waste machine capacity—it has been necessary to introduce an intermediate rate, of, say, 7 cents a box, which he is paid if he fails to attain the full standard of 50 per day but manages to make 40 per day. As soon as you begin to do this sort of thing you begin to spoil the simplicity of the differential piece rate and you might as well adopt the Emerson system entire and secure its various advantages.

Explaining and Installing Systems

An assistant of mine who had set a great many rates under both systems sized the matter up this way:

> It's easier to go out in the shop and explain to a workman that if he makes 50 boxes a day he will get 10 cents apiece for them, but that if he makes less than 50 boxes a day he'll only pull down 5 cents apiece for them. That's easy to say and easy to understand, and if he counts his boxes from time to time during the day and watches the clock he knows just where he stands all day and how much he has earned when he goes home. The trouble is getting him to believe

he can make 50 boxes a day when he has been making only 20. It doesn't seem possible to him—and he's got to make the whole increase in one jump or he doesn't make any premium. Probably he tries hard two or three days and because he doesn't make the 50 he doesn't get anything for his extra effort. He gets discouraged and says, "To hell with the

Figure 50. A "Technical Man"

He could not speak English, but he learned to operate the Seger gauge he is carrying and he learned to read graphs and to enter readings from various technical instruments and notes as to the progress of the work upon the record sheets.

premium." Then you've got to do an all-fired lot of persuading and showing and encouraging before you can get him to go after it again.

With the percentage of efficiency system, it's pretty hard to get it over to the workman that he's going to be paid according to his efficiency and that if he attains 100 per cent and makes 50 boxes a day he will get 20 per cent bonus added to his day rate of $4. He doesn't understand what it is all about.

> But at the end of the first day when you tell him he has made 40 boxes and therefore is 80 per cent efficient and has 12 cents extra coming to him on pay day he takes a mild interest and can be persuaded to try again. The next day he makes 42 boxes, is 84 per cent efficient, and earns 20 cents bonus. This persuades him really to try. He makes 48, is 96 per cent efficient, and earns 64 cents, and by the end of the week, having averaged 90 per cent efficient, he pulls down an extra 10 per cent in his pay envelope and after that he believes you are a "regular guy" and is for you whether he understands you or not. After that you can fix him up a little chart on the wall which shows him every day how near he is hitting the green line marked "100 per cent" and he is sold on the proposition. You've done it all so smoothly and painlessly he didn't know he was working hard until the money was coming in—and from the time he got that first pay envelope he was for it. It looks to me as if the chief difference between getting a man up to standard with the differential piece rate and on the bonus system is about the difference between telling him to jump up onto a box 4 feet high with one jump and giving him a step ladder and telling him to climb up. He may shy at the ladder at first but making the jump is a lot more painful for everybody.

Gauging Plant Efficiency

One of the great advantages of the percentage of efficiency system is the opportunity that it furnishes to gauge the exact efficiency of the whole plant. If the foreman of the department knows each morning just what percentage of the standard quantity and quality of production each man has turned out the day previous he knows by averaging these percentages,[2] just how efficient his department has been. If the plant superintendent knows the average percentage of efficiency attained by the departments for whose operation he is responsible, and the efficiency of each department, he knows which departments

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[2]The determination of a department's or of a factory's efficiency as a whole is not as simple as this but I wish to avoid fogging the issue by a long digression into weighted averages and similar details.

need his personal attention. If the general manager knows each day or every week just which plants are falling below reasonable standard of efficiency and just how much, he knows whether or not it is safe for him to throw his entire energies into the stimulation of the sales department, the refutation of

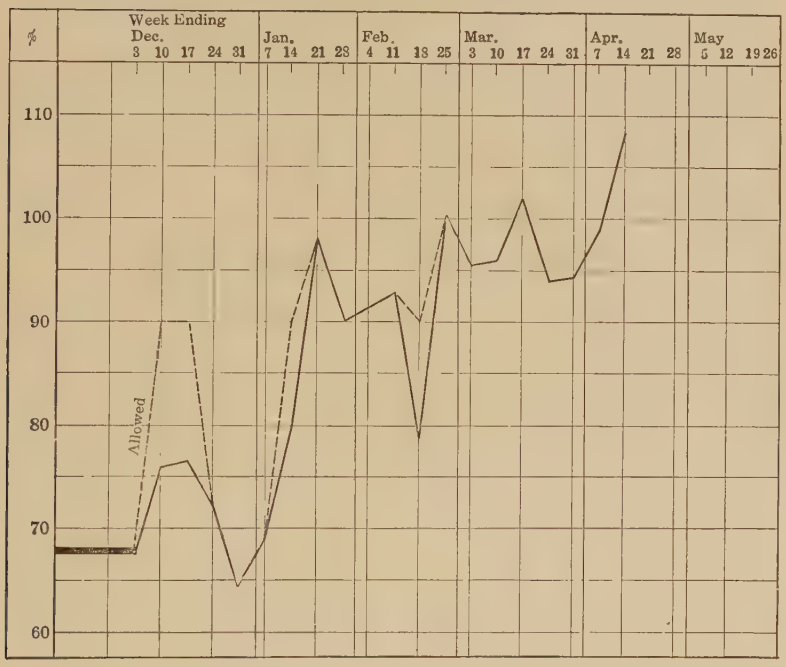

Figure 51. A Typical Result of Placing a Crew on Bonus

Note the initial efficiency of 67 per cent, the slight improvement due to the presence of the engineer, the slump when the crew is first left to its own devices, and in January the growing conviction that the standard is reasonable, followed by an average of attainment of 100 per cent in March.

certain allegations dropped by the Attorney-General's Office, or golf, or whether he'd better drop all for a rush visit to one of the factories.

Furthermore, with standards for quality and quantity scientifically and fairly set throughout the plant each man knows that he and his department are getting a systematic and

impersonal "once over," based upon cold facts at regular intervals all the way up the line. There is no starch for a man's backbone like the knowledge that he will get all that's coming to him—good or bad—for everything he does. If you don't believe it think how many men during the last couple of thousand years have stayed in the narrow path because they believed in hell-fire and a bluff-proof recording angel and how many women have done the same thing because they believed in heaven and the same impartial and all-seeing secretary.

Fairness and Need of Rate-Setting

The determination of standard times for each job is a requisite for accurate planning and for prompt delivery to the customer. How could Benjamin Franklin have promised a job of printing without some idea of how long it would take to complete the work he had in the shop and how long it would take to complete the new job? With the growth of industry, how much more necessary has become the need for standards of output for each machine and each man! Since wages are what induce most of us to work, rate-setting and rewards, based upon what each of us can turn out comfortably—and without injury to our future health or the future health of the race—are not only necessary but fair, fair to the workman, to the executive, to the stockholder, and to the community. "A fair day's pay for a fair day's work" is the slogan. Let us face the situation with common sense and adopt every measure and every method that will substitute facts for phrases whose idealism is equaled only by their nebulosity.

CHAPTER XII

RATE-SETTING AND INCENTIVES ABROAD

Wage Payment in Italy

In Italy the day-wage system seemed to be the commonest method of paying workmen. The piece-rate system is also in quite general use, the output per day being determined by letting a foreman or an experienced man try out the new job and the rate per piece being fixed by bargaining with the workmen. In a number of plants there was a day rate of 1.5 lire per hour to which the men added from 1.5 to 3 lire per hour by piece work. I was unable to secure any evidence of the existence of scientific rate-setting.

In one large plant effort was stimulated by mottoes—"Whoever wastes, damages himself," "The habit makes easy the difficult task," and like inspiring sentiments. The same plant was equipped with suggestion boxes. One workman had dropped in plans for a valuable invention and was rewarded with a small royalty and a foremanship. Instinctively I thought of Bill Jones on the Sante Fé, who, more than ten years ago, after the Emerson engineers had set standards by analytical time study, worked out an improvement in his machine by means of which he could make $35 a day. Only a year or so ago I was told that, as the company had never cut the rate, Bill was still getting his $35 a day.

In an Italian soap factory I found a piece-work committee elected by the workers themselves. I was told that this committee met the management every month with suggestions and complaints and on their own initiative eliminated poor workmen. In addition to piece-work earnings, ranging from 10 to 20 lire a day, a bonus based upon the total production per

day for the plant was paid. The month I visited the plant this amounted to 3 lire a day.

In a large steel plant a bonus for saving oil and similar supplies was paid the workmen. A standard was set and the value of all savings over and above the standard was shared equally by management and men. This system is similar to that in effect in a certain progressive Cleveland plant where the standard consumption was fixed and both the standard and actual consumptions were figured at fixed rates. Standard consumption was then divided by actual consumption and a bonus was paid in accordance with the percentage of the workmen's base rate called for on an Emerson 20 per cent bonus chart.

I found evidences in several plants of special efforts to place responsibility for poor work. In one large locomotive plant the rivets driven in the boilers were chalked to indicate who had done the work. Automatic time-clocks of the most improved type are in general use, even in some of the more remote plants.

Rate-Setting in Germany

In Germany, piece rates in the more progressive plants are set by a certain division of the Vorkalkulation Department, which amounts virtually to a rate-setting department. This division decides how much time the machining will take and adds to this time an allowance for manual work and for bad luck. In setting the machine time the usual practice is to use "over all" times[1] based upon the timing of similar jobs

[1]Under scientific management the usual practice is to divide the job into its elements—some of them requiring only a fraction of a second—and then to record the time and method of performing these elementary operations enough so that a standard time and method may be prescribed. This standard represents the one best way of doing the work under the conditions which exist. It is the basis of the standard instruction card, which is furnished the workman for his guidance as to how to perform the work in the standard time in order to secure the standard reward or bonus—"the fair fair day's work for the fair day's pay." Those who wish to go into this matter fully should consult Mr. Merrick's book, "Time Studies for Rate Setting"; that by Mr. Lichtner, "Time Study and Job Analysis"; and the account of the debate before the Taylor Society published in the Bulletin of the Taylor Society, June, 1921. This

done in the past. If the men encounter too much bad luck the blue work ticket previously described is issued to them to cover the extra time required to do the work over and above the time allowed them by the regular work ticket—made out under the direction of the rate-setting division of the Vorkalkulation Department when the work was planned.

Allowances of this sort are generally a fruitful source of discontent unless precisely what constitutes just ground for an allowance claim is defined in writing to the last detail. Even then there are lawyers on both sides—workmen and foremen—who indulge in "interpretations" which cause hard feeling. The most horrible example of this sort I ever encountered was a bonus for regular attendance, which was paid men who had a good excuse for being absent. After some months of trial, during which it made liars of every man who wanted a day off, and maniacs of the time-clerks who attempted to decide as to the validity of the excuses offered and as to the truthfulness of the absentees offering excuses, the system was discontinued amid general rejoicing.

Office workers in Germany are paid overtime in addition to their weekly pay. This amounts to .7 or .8 per cent per hour of their monthly salary. Thus a man who worked one hour overtime on a salary of 1,000 marks a month would receive 7 marks per hour, or about "time and a half," for each hour overtime he put in at his desk. The regular hours for office workers are from 8:15 to 5 with half an hour off for lunch, except on Saturday, when the working day ends at 1:30 P. M.

In one German plant I found in addition to the system described above a distinction made between "set-up time" and "machine time" on the workman's ticket. This plant figured

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article gives, in the form of reference notes, what amounts to almost a full bibliography of books and articles on time and motion study. In comparing German methods with the methods in use elsewhere, the fact that German workmen are trained to their jobs from boyhood—both as to technique and as to "will to work"—must never be lost sight of.

the time required for each job in minutes and then paid different rates for different sorts of work—dependent upon the skill required for the work. It is the usual custom to pay for good work only, payment in each case being OK'd by the inspection department. Extra copies of the workmen's tickets showing earnings are furnished workmen, which they retain until pay day for use in case of a dispute. This same plant was equipped with suggestion boxes and as an additional incentive workman were allowed 50 pfennigs to pay them for the time expended in writing each suggestion card.

View of British Labor

The situation in England is best understood after reading G. D. H. Cole's[2] book, "The Payment of Wages," which sets forth the workman's viewpoint in an exceedingly clear and logical manner. One or two extracts will make what is to follow somewhat clearer:

> Another point which cannot be too strongly stressed is that the claims put forward by a few Scientific Management experts, and in particular by Mr. Taylor himself, that their systems do away with the need for collective bargaining, have not the smallest foundation. Mr. Taylor contends that, when once Scientific Methods of fixing times and prices have been adopted, payment by results is no longer a matter for collective bargaining, but merely a matter for cold science, and that there can be no difference between employer and workman with regard to the proper prices and times for each job. At the same time Mr. Taylor assumes without any argument

[2]Mr. Cole, as Honourable Secretary, is in charge of the research work of the Labour Research Department, which was formerly a part of the Fabian Society. The Labour Research Department furnishes the data for and otherwise co-operates with the labor, socialist, and co-operative movements. The Labour Party in England is led by intellectuals and supported largely by trade unions. It is socialistic and frankly antagonistic to capitalism. The phrases made by the leaders of the Labour Party form the language of that section of the trade unions which is vocal, and English industry is something over 80 per cent organized. Mr. Cole, while working wholeheartedly for the improvemnt of the condition of labor, understands the viewpoint of management and capital thoroughly and realizes their part in the economic structure, and his books—which are obtainable at the Labour Research Department's headquarters at 34 Eccleston Square, Westminster, London, S. W., England—should be read by those who wish to understand fully the attitude of the British working man toward the various elements of scientific management.

that the expert who fixes prices will be the servant of the firm, paid by the firm and doing the firm's work.

All the time-study in the world cannot show how much ought to be paid for a job. *It can only show at most the length of time a job ought to take.*[3] That is to say it cannot determine what is to be the standard of living or of remuneration of the workers. An hourly rate, or at least a standard of living must be fixed or assumed before the Scientific Manager can set his system of payment to work, and, as there can be no Scientific Method employed in fixing such a rate, the rate is essentially a matter for bargaining[4] on a collective basis. This, indeed, is only another way of saying that Scientific Management has only devised a further method of payment under the wage system. Scientific Management does nothing to remove the need for collective bargaining and Trade Union organization.

That the application of scientific principles to industrial organization is a good thing we can all agree in the abstract; and we can at least reach an agreement in practice where only inanimate objects are affected. The improvement of industrial research, of factory organization, of the estimating of costs of production, of the routing of jobs, of the dovetailing of orders, and of the co-ordination between shop and shop and between factory and factory undoubtedly call for more "science" and there can be no quarrel with any attempt to apply science purely in such spheres. There is a real sense in which industrial management is a science, just as there is a real sense in which political government is a science.

Time-work on some jobs and piece-work with a guaranteed weekly rate on others afford all the inducements to output which ought to be afforded; and the decision on any class of work as between time-work and piece-work ought to be made by negotiation between the employers and the Trade Unions on the merits of each case. *Where piece-work is*

[3]Italics are the author's.

[4]Which brings us up against the problem of demand and supply in the labor market—or in any other market where bargaining, which is a battle for advantage on the part of opponents who each desire to get the most for themselves, match resources mental, physical, and moral. This brings us to Napoleon's cynicism, "Luck favors the side with the heaviest artillery," and encourages both sides to concentrate on piling up the munitions of industrial warfare rather than upon cheap production, to the end that each unit of mankind may possess the largest quantity of things. Disarmament doesn't seem consistent with class patriotism—or even with national patriotism—as long as classes and nations are organized to protect the interests of the group.

adopted, more scientific systems of determining piece-work prices ought to be devised; but the determination ought to be made jointly by the two sides, and the science necessary for it ought to be in the possession of both.[5]

This brings me to my second point. Time-study, motion study and the other expedients of Scientific Management may have some beneficent results, especially in such spheres as the study of industrial fatigue and the relation of output to hours of labour. But here again science must not be the monopoly of the management or of the employer. The Trade Unions must equip themselves with the knowledge that is required and "science" must become the handmaid of collective bargaining. Just as it is one thing to say that "welfare" is desirable and quite another to approve of "welfare work" under the employers' control, so it is one thing to desire industry to become more scientific and quite another to accept Scientific Management at the hands of the employing class. Taylor's contention that under such conditions an equal balance will be struck between the management and the workers because both will be subject to the "rule of law" is unmitigated nonsense.

Thirdly, Scientific Management presents a number of real dangers to industrial democracy. The methods of payment which it suggests are for the most part a crude appeal to individualism and it is generally agreed among Trade Unionists that where they are adopted the *morale* and sense of solidarity among the workers are often lowered. They tend to set each man's hand against the others and inaugurate a system of cut-throat[6] competition between worker and worker even in the same grade. In many of their applications they may be fatal to collective bargaining and the standard rate,[7] though this is not necessarily or universally true of all parts or aspects of them. It is most true where Scientific Managers adopt the device of a "scientific" grading of labour which subdivides the workers into very small groups or even treats each worker individually on his merits. Against such tendencies Trade Unionism must fight. It must preserve at all costs

[5]Italics are the author's.

[6]The distinction between "cut-throat competition" and the "healthy competition" of outdoor sports—football, races, and baseball—needs some defining.

[7]A rate set by bargain.

its effective right of collective bargaining, the standard rate and the solidarity of Labour.

Fourthly, Scientific Management tends to make more impassable the gulf between Labour and Management. . . . For one who believes, like myself, that one of the next steps for Trade-Unionism, in its gradual assumption of control over industry, will be to take altogether out of the employers' hands and vest in the Trade Union the appointment of foremen and the organization of the workshop,[8] this appears as a counter-move on the part of Capitalism to remove the foremen from the possibility of control by Labour. The way for Labour, to my thinking, is the gradual conquest of management. For this, Labour must equip itself with scientific and industrial knowledge; and while it is doing so must resist any move by the employing class which will make more difficult the conquest of industrial control.

Trade Union rules are resented by the employers as invasions of capitalistic autocracy and as outrages against capitalistic "competence." The employer, on his own showing knows how to run industry; the workman does not.

My fifth point follows logically. The employer, I have said, on his own showing knows how to run industry. Does he? It would seem that during the war he has been discovering very rapidly that he does not, if we can judge from the cry of reorganization which has arisen in the employers' own ranks. There is a very wide scope indeed for scientific reorganization of industrial methods; and if the employers would devote to these half the attention which they devote to trying to bully, badger, bribe or cajole Labour into the acceptance of unscientific systems of payment by results, it would be better for all concerned. The biggest and most natural field for science in industry is in the management of inanimate objects; and there let it be applied in full. Where it af-

[8]This is, of course, a regular step in the program of those who would "socialize industry," which contemplates the remuneration of actual producers only. Labor realizes—especially since the Russian and Italian experiments—that executive and technical talent is necessary to the survival of industry when it is grabbed by the workers.

In the final analysis there is a certain parallel between this plan and that of the White Motor Car Company which limits the earnings of invested capital and turns the balance of the profits over to the working force in the form of salary and wages after setting aside various reserves to insure continuous operation. The main difference is the retention by capital of the privilege of appointing executives—in order to protect itself.

fects men and is applied to men its effects are far more problematical.

We must apply science: but we must not allow science to be a class monopoly. The Trade Unions must train themselves for control and in doing so they must resist all changes which would have the effect of destroying or weakening their economic power. We cannot expect a truly efficient system in industry until we have an enlightened democracy capable of controlling industry: we cannot abolish the class-struggle with a blast from the trumpet of science. But we can make up our minds that the end towards which we must strive is industrial self-government: and we can test the schemes of Scientific Management by means of this principle. If we do this we shall not find it wholly bad; but we shall find in it many dangers against which Labour must be on its guard.

When we consider that this is by far the fairest treatment which scientific rate-setting has received from the leaders of organized labor in England and that most of British industry is organized, it is easy to understand why it has been necessary to exercise great caution in introducing scientific management into British industries.

The Taylor system as such is thoroughly unpopular in England, principally because of certain statements in Mr. Taylor's book, which he himself later admitted were tactless and open to misconstruction. After describing the Taylor and Gantt systems Mr. Cole continues:

On the whole, however, British manufacturers have tended rather to take the Emerson efficiency task as a basis and to base upon it various modified efficiency systems which aim at securing similar results. The essence of the Emerson system is that the bonus paid for efficiency begins at a comparatively low point and the stimulus is thus afforded to even the less efficient types of workers. This feature is reproduced in many of the British systems,[9] especially in those which are designed for repetitive jobs and above all in those which are designed for women.

[9]See "A Rational Wages System" by Henry Atkinson (G. Bell and Sons).

British Employers' Opinions

Employers in England approve of much that Mr. Cole says. For instance, in a series of articles ending in January, 1921, which appeared in *Business Organization and Management,* by two engineers who are on the staff of one of the biggest industries in England—A. P. M. Fleming and J. G. Pearce—occurs this statement:

> Clearly, under any system of management unaffected by collective bargaining, scientific management may be able to determine the value of one man relatively to another on a basis of output or even of relative skill, but it has no means of determining what absolute wages any man should get. A claim such as the one that it makes collective bargaining and trades unionism unnecessary as a means of protection among workers merely irritates organized workers and the fact that it is untrue makes it all the more serious as a tactical error. It is significant that Harrington Emerson and even some men of the Taylor School, notably the late Mr. H. L. Gantt, specifically dissociate themselves from the views of the extreme school.

Machinery for Reviewing Rates

The following is the plan proposed by the managing director of the English Electric Company:[10]

> Rate-fixing, as it is commonly understood, has in practise simply meant this—that the employer fixed rates scientifically or unscientifically, but in secret wrote them down on a card, and gave them to the workman "to take or to leave." There was no pretense of making the operation a bargain between the parties, no opportunity for either party in any open, straightforward manner to have rates reviewed when once fixed.
>
> This is a system which is fair neither to the employer nor to the workmen, and it will have to be abandoned if piecework is to be extended. *The first step is to make rate-fixing scientific and the next is to provide proper machinery for dis-*

[10]Pybus, P. J., C. B. E., M. I. E. E., *Factory Magazine,* December 1, 1920.

cussion of, and arbitration on, rates which have been fixed.[11]

Perhaps I may be allowed here to outline the following proposals for setting up simple machinery for this purpose in a modern factory.

When a rate is fixed for a new job it is offered to the man concerned. If he questions it, he is at liberty to go to the time-study office to work through the calculations with the official responsible for them, to point out any errors, and to have them rectified. If the man remains unconvinced that the rate is reasonable, he can then demand a reference to a committee which must meet within two days of the complaint. Pending the meeting the firm's rate is adopted provisionally. The decision of the committee when given is retrospective, but no figures as to the time taken on the job between the fixing of the rate and the meeting of the committee are accepted as evidence by the committee.

The committee consists of three representatives of the firm and three of the men, of whom one is the workman concerned and the others, selected by him, are two men operating the same type of machine or whose work is similar to that in dispute. If the committee fails to agree, the firm is called on to demonstrate in its own works that the rate offered is a fair one.

It is open for the firm to set in motion the same machinery for reviewing a rate which the firm regards as too high, but it is understood that any reduction so made on review will be compensated for by an equivalent addition to the rate for some other job less favorable to the men.

One great advantage of this scheme is that it brings the whole difficult and intricate process of rate-fixing out into the light of day and reveals it in its true character as an open bargain between the workman and the employer.

The scheme is capable of development and improvement. I see no reason why, in order to meet a difficulty which confronts the whole engineering industry, the principle of an appeal on piece-work rates should not receive more formal sanction. At present, extremists on both sides present a formidable obstacle to co-operation between employers and labour to the advantage of both.

[11]Italics are the author's

Adaptability of the Emerson System

The Emerson bonus system makes the objections outlined by these Englishmen particularly easy to meet. In the first place it consists of a *base rate,* which must be equal to the current rate paid for similar kinds of work in the district. The current rate is fixed by the condition of the labor market, collective bargaining, the cost of living, and all those things which fix ordinary wages. In the second place a *bonus,* which is a percentage of the base rate, is paid as a reward for the attainment of certain scientifically determined quality and quantity standards. The base rate fluctuates with the current wage rate in the district—is "set by collective bargaining," if you like—but the standards of quality and quantity and the percentage of bonus for attainment of these standards are never altered unless the conditions which govern are materially altered.

This method avoids the suspicion of "cutting piece rates," which is always present whenever men understand remuneration in terms of the "price per piece" and fundamental conditions necessitate lowering wages. The most progressive American companies now change the base rate only when there is statistical proof of a change in living costs. The United States Department of Labor now gets out a bulletin which gives commodity prices by districts each month. From this a weighted average, representing the usual family's expenditure, is worked out and alterations in base rates are made only after discussion of these statistics with the working force. This plan is much fairer than the old arbitrary cut. The casuist, of course, inquires what evidence there is that the cost of living and wage—say, in 1914, before the war—which is adopted as a basis for figuring these fluctuations—was fair. Again we are bang up against "collective bargaining" and Napoleon's assertion as to the resting place of luck.

The Priestman System

The British Higher Productive Council favors the Priestman Brothers' plan of reward for production as less dehumanizing than "Taylorism, which appears to be based on a kind of German regimentation to which we are all instinctively opposed,"[12] as "more in keeping with the British temperament because, in appealing to the team spirit they are appealing to that which is already so highly developed in British sports." Under the Priestman system the managers, in agreement with the workers, assess what they call the "standard output per month." The bonus is based upon this standard and varies directly with the percentage by which the actual output exceeds it. (Standard 100 tons, actual 120 tons, wage of everyone increased 20 per cent.) This is considered one of the most successful "payment by result" systems in England and is widely discussed. If applied by means of collective bargaining to two shoe factories in the same town, one of which was 50 per cent efficient and the other 80 per cent efficient, the final earnings of the men in each case would present some interesting economic and ethical problems.

Where the unions in England allow or connive at piece work,[13] the earnings of all workers under it must amount to at least 25 per cent more than the fixed union scale. In one very large plant I found a day rate of 62.5 shillings a week for the day shift with piece workers earning 25 per cent extra. Those on night shift received 12.5 shillings additional. In some cases the group bonus based on standard output set for the department was in effect. There seemed to be comparatively little systematic soldiering and the shop spirit was exceedingly good.

[12]Mr. Taylor's pig iron handler, as described in his own book and the Hoxie report, represents the evidence whenever anyone abroad—from a labor agitator or an uplifter to a defender of "things as they are," or a patriotic reactionary—wishes to smash scientific management.

[13]In one case a union which was offered a bonus appealed to an expert to decide whether the bonus was "payment by results," which the union rules forbade. Their leader said, "We'd like to have the extra brass if it don't violate the union rule and if we don't have to understand how the bloody thing is figured."

An Application of the Group Bonus System

In another plant the efficiency of each operator in each department was figured each week, a bonus curve similar to the Emerson being used, and the individual efficiencies being shown on a wall chart in each department. These efficiency percentages, which indicated how nearly each operator performed his part of the department's quota or standard output, were combined and charted as a department efficiency. Department efficiencies were combined into division efficiencies, and division efficiencies into a total output efficiency for the plant. Each division is paid bonus in proportion to its attainment of the division standard. If a division falls down, the system makes it possible for all to see just who was responsible. Some divisions were 110 per cent efficient at the time of my visit, which had been only 20 per cent efficient a couple of years before when the plan was put into effect. Wherever possible workers are also on piece work in addition to this group bonus. Just how scientifically standards were set it was impossible to judge, although my judgment was that the work was extremely efficient. The shop spirit was certainly excellent.

The superintendent of this plant was on bonus also. The standard was the cost per unit at pre-war prices of labor and material. Against this was set the actual cost, the superintendent being credited with the rise in labor, material, savings made by improvements for which he was responsible, and salvage, and being debited with waste and savings made by improvements for which he was not responsible. When his account was substracted from the cost per unit the balance was subtracted from the standard and the difference, multiplied by the number of units produced, represented the net saving (or loss) his acts had resulted in. He was paid 10 per cent of this saving. His bonus was running about £500 a year at the time of my visit.

Other Methods in Use

In one department of a very large plant I found a foreman who had worked out a sort of group bonus for his department which was unique. The department contained about a hundred men working on automatics. He said he paid the men on piece work and further demanded the departmental quota daily regardless of how many machines were broken down or how many men were absent! I fear he was striving to please!

In one of the best operated plants I have ever visited standards were very carefully set over a period of something like four years. Four classes of pay were then established based upon the actual attainment as compared with these standards, the lowest being above the union scale.[14] In this plant individual record cards are kept showing each man's percentage of attainment of standard each week in the form of a graph. Each man's attainment of standard cycle time is also shown. Cycle time represents the theoretical time each machine could have run had there been no delays of any sort. Men are paid according to the class to which their efficiency percentage entitles them.

Some Failures of Group Bonus

In another plant, to some extent under American influence, I was told that the gang bonus had been discarded because the fast workers refused to speed up the slow workers, who adopted the attitude of "Why should we work, we get our share just the same?" A guaranteed day rate was substituted, with a sliding bonus scale in proportion to output (Emerson principle). According to the new plan rates are set, though rather roughly, with a stop-watch, a 25 per cent fatigue allowance being added. Individual record cards are used and foremen are paid in accordance with the efficiency of their depart-

[14]This is exactly the same plan of payment devised by certain industrial engineers during the war to meet organized labor's objections to piece work and bonus.

ments as shown by these cards. Very careful tabulations of the number of workers on standard—those 90, 80, 70 per cent efficient—are compiled each month. The individual workers are also marked on conduct and quality of work and paid bonus in accordance with their attainment of standard. When I saw this plant the shop spirit was exceedingly good, the girls from time to time breaking spontaneously into song as they do in the chocolate factories. This plant was one of the few "open shop" establishments I encountered in England.

Group bonus is very much under discussion at present. Theoretically its success rests upon the drones being driven out by the workers. The truth seems to be that where the standard for the group is set by "experience" instead of by means of a careful analytical time study, there is nothing to prevent the workers from limiting their output to half what could easily be turned out without injury to anyone. There are all the reasons why they should do so that exist in the case of piece rates set in the usual way. We have just cited one case of failure. The Santa Fé Railway tried and discarded the group bonus. Industrial engineers who have worked in automobile plants where the chain assembly is used know that even when the pace is regulated by machinery the gang along the conveyer very often is not doing within 20 or 25 per cent of what it could do. Where progress is not mechanically regulated the efficiency is even lower. There have been some very successful installations where progressive machining makes it possible to set standards for comparatively small groups of machines, whose operators are paid on a basis of the work they turn out as compared with a standard set by means of the analytical time study. Under such circumstances "hard luck" is pooled and time-keeping is simplified. But anyone who thinks he will be foxy and induce the average crew to chase each other into maximum output for his benefit

—all unsuspected by the workmen—is sadly lacking in knowledge of labor psychology.

Rate-Setting in France

Scientific rate-setting has gone further in France than in any other European country. We have already referred to the work of Coulomb and Vaubon who attempted to establish unit times on various sorts of work several centuries ago. At one plant I found that scientifically established piece rates had been in effect over twenty-six years. Such operations as replacing the linings in steel furnaces had been standardized to the point where the time allowed varied with the temperature of the furnace at the time the work was done. In one plant payment was made on a basis of actual metal chipped. After the work was completed the channels were filled with mastic which, after it had been struck flush with the top of the aperture, was removed and weighed and the payment based upon this weight.

French labor unions are asking for time study as a basis of determining the fair day's work. In one case where rates were being readjusted after the war the men in a very large establishment demanded that the company's industrial engineer do the work on a basis of standard operation times. A large shipbuilding plant has had standard times in effect for over five years. At another enormous establishment over 100,000 standard instruction cards are in use. Time study is in use at the plants manufacturing electrical goods. Standard times have been established in the plant which manufactures the municipal omnibuses in Paris.

The establishment of standard times in France has brought to light exactly the same sorts of inefficiencies and injustices that the same work always uncovers in America—material and tools which cannot be depended upon and all sorts of delays chargeable to ineffective management.

Method of Setting Standard Time

The method of setting the standard time is similar to that in use in America. An analytical time study is made of the job until unit times can be established for each element of the work, which when combined represent the time each operation should require under conditions which are normally attainable by a good workman. These operation times are classified into "preparation time," "handling time," and "machine time," and a different fatigue allowance is made for each, depending upon the sort of work. In the case of a certain type of work in a shipbuilding plant, 40 per cent fatigue allowance was made on manual work (handling time) and 10 per cent on machine time.

To the standard time for the job so established—which would represent the 100 per cent efficiency for the job under the Emerson system and the standard of performance or task at which the higher piece rate goes into effect under the Taylor and Gantt methods of payment—what is called a "bonification" is added. The standard time and the bonification, which is usually 20 per cent, together form the "time allowed" for the job.

Whenever the workman completes a job he is paid the "time allowed" for it. It is expected that a normal workman working under standard conditions will—with a 30 per cent bonification—make 30 per cent overtime, which is really his bonus for doing the work in standard time. Each instruction card gives the detail of just how the "time allowed" is arrived at, as shown in Figure 52.

The workman—if he does the job in standard time—in the case illustrated in Figure 52, 149 hours—makes 30 per cent bonus, if he does it in "time allowed," or if the job takes longer, his regular hourly rate prevails. If he does it in less than standard time he makes more than 30 per cent bonus. is in effect an example of "day rate guaranteed, and bonus

exactly in proportion to accomplishment," which is the principle of the Emerson system of reward.

Operation		Time			Speed, Feed, etc.
No.	Description	Preparat'n.	Hand	Mach.	Sketch of Piece
1		15′			
2		55′			
3				348′	
4				65′	
5			25′		
6			20′	98′	
7			17′		
8		60′			
9				112′	
10				158′	
11				166′	
12		12′			
13			27′		
14				277′	
15		15′			
16		20′			
17		20′			
		197′		1224′	
Majoration de 40%		79′			
" " 10%			–	122′	
Total		276′	89′	1346′	
Total				1711′	
Bonification de 30%				515′	
				2226′	146 hours

Figure 52. Instruction Card Showing How Time Allowed Is Computed

Record of Bonuses Earned

Very careful records are kept of the percentage of bonus earned by the men in each department. (See Figure 53.)

The simplicity of the thing is beautiful—a graphic statement of just how many jobs in the department during the

two weeks fall within each class. The manager knows how much bonus is being earned and whether the standard times were set with sufficient care to enable the majority of the men to earn 30 per cent standard bonus. It also emphasizes sufficiently the non-bonus jobs and those upon which extraordinary earnings were made so that investigation will follow.

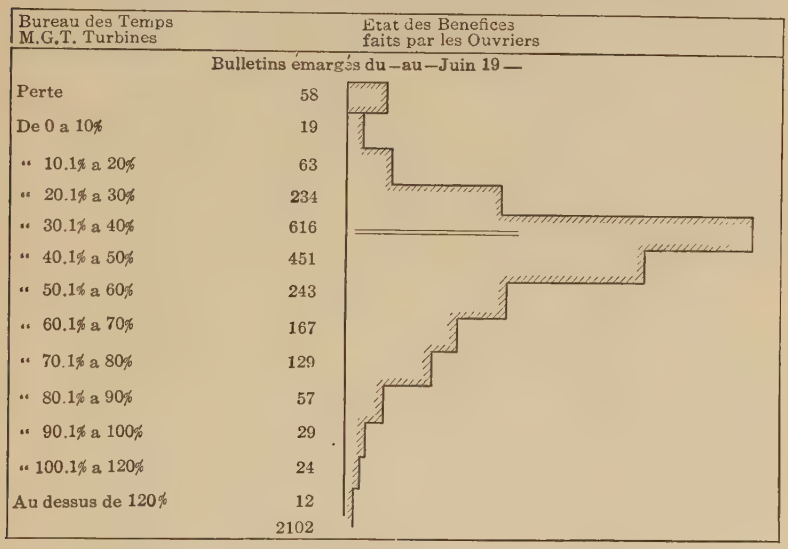

Bureau des Temps
M.G.T. Turbines
Etat des Benefices
faits par les Ouvriers
Bulletins émargés du —au— Juin 19 —
Perte 58
De 0 a 10% 19
" 10.1% a 20% 63
" 20.1% a 30% 234
" 30.1% a 40% 616
" 40.1% a 50% 451
" 50.1% a 60% 243
" 60.1% a 70% 167
" 70.1% a 80% 129
" 80.1% a 90% 57
" 90.1% a 100% 29
" 100.1% a 120% 24
Au dessus de 120% 12
2102

Figure 53. Record of Percentages of Bonus Earned

To this record are attached several analysis sheets showing the number of jobs done, the number for which instruction cards were available, and the number of new studies made on each class of machine work. The individual jobs classified according to machine types are then analyzed by order number and instruction card number and the percentage of planned time vs. actual time is given. The particular analysis sheets I have before me show that the planned time was 1.11 per cent of the actual time in the case of the *Tours,* 1.11 per cent in the case of the *Outils,* 1.09 per cent in the case of the *Main,* etc., for the whole month of June.

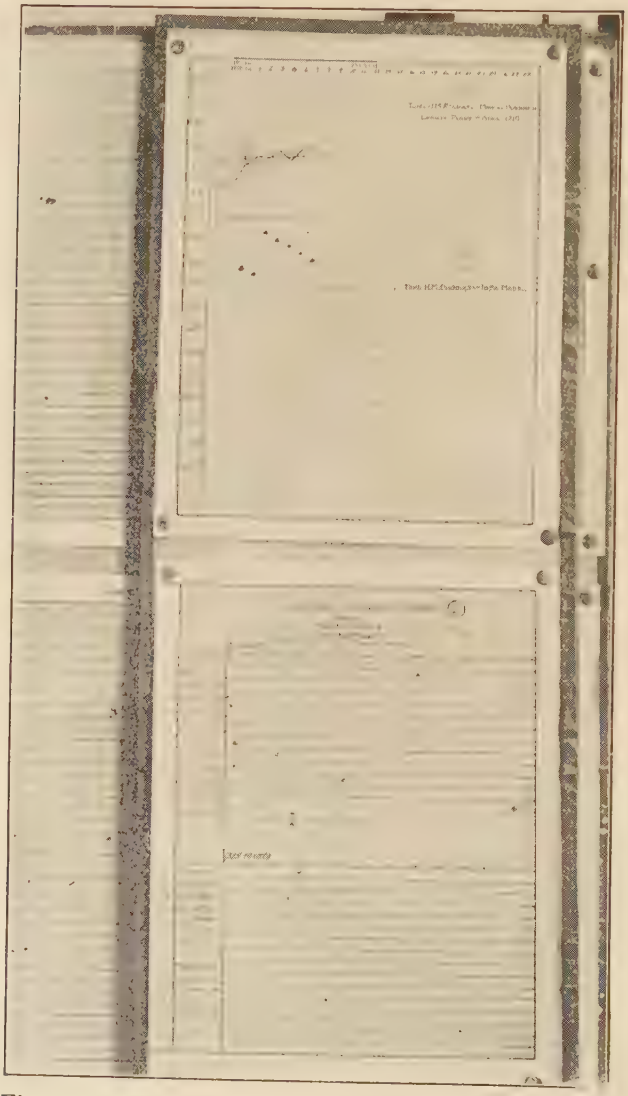


Figure 54. Analysis Sheet Showing Planned Time as Against Actual Time

Top section of top chart shows "planned" vs. "attained." The second section shows the unfilled orders in tons, as do the two sections of the lower chart.

This latter is a record which I have personally found exceedingly valuable as it shows not only the efficiency of planning but the efficiency of shop co-operation. The actual output each day is platted in black against the output planned, (see Figure 54), which is platted in red and entered upon the chart directly after the planning meeting held on the afternoon previous. The discrepancy then between the red and the black lines represents either poor planning, i. e., failure to attain the standard output to which the departmental foremen have agreed, or poor co-operation between planning and executive departments in carrying out the plan in the shop. The discussion which ensues at the meeting the following day places the responsibility and tends to discourage either the planning department or the shop making the same mistake again.

Other Systems in France

At one French plant which I visited there was a group bonus based on the degree of attainment of a standard output set for the department. Thus, if 40 tons a day was the standard for a rolling-mill or a forgeshop employing 40 men and the average for the month was 30 tons, every man in the crew would get ¾ of the sum set up as bonus. Various other sorts of bonus have been in use for a very long time in France. In one plant they pay the man who makes the record for the month on certain sorts of work a bonus of 50 centimes a day all the next month. Sometimes a bonus is paid to the workman who wears out the least number of tools —as compared with a standard—during the month. The "war bonus" is really not a bonus at all—in the sense that the term has been used in these chapters—being simply a raise in wages to take care of the rise in the cost of living during the war, disguised as a bonus in the hope that the workers could be separated from it more easily after the war when values returned to normal.

At another plant I found a well-organized time-study department which determined the standard times required for each operation. The instruction cards carried separate columns for machine time, hand time, etc., and the total represented the standard time—or the time the job would take a good workman. This standard time was then reduced to a price per piece expressed in francs. The workman receives his day rate under any circumstances. To this is added his piece-work price. This is figured as follows:

Standard price per piece	.11	francs
Pieces man makes per hour	12	
Piece rate earning per hour (.11 x 12)	1.32	"
Piece rate earning for 8 hours (1.32 x 8)	10.56	"
Day rate	11.20	"
Total wages per day	21.76	"

If the workman makes more pieces per hour than the standard he gets only half-price for them.

National Characteristics

There is no question but that the French industrial engineer gets down to fundamentals in determining the factors that regulate the time required for a given piece of work. His principal handicap has been lack of the most modern machine tools. Nevertheless he realizes thoroughly the necessity for carefully set standard times, the importance of instruction cards and the necessity for rewarding the workman exactly in proportion to what he accomplishes if plans are to be carried out successfully, and if efficient production is to be maintained continuously. The French workman, in spite of his respect for paternal methods, has been unusually quick to grasp the many and logical reasons for standardization. As a result, France, in her most progressive plants, has devel-

oped much that is worthy of careful and prolonged observation and study.

In studying the system in use in each country due allowance must be made for the inherited characteristics of each people. What appeals to workmen as an incentive in one climate and environment does not interest them at all elsewhere. Furthermore, a phrase which sounds perfectly harmless in one country is a perfect detonator in another. All this must be taken into consideration when the reaction to various systems of rate-setting and of incentives are studied in each country.

CHAPTER XIII

PERSONNEL DIRECTION

Materials, Processes, and Gain

Personnel direction is simply another phase of industrial specialization which has arisen as industry has grown. We have seen how standardization, planning, dispatching, and rate-setting have developed to cover the material, mechanical, and production speed elements, as the industrial unit has grown from Benjamin Franklin's shop, in which the owner worked with his four or five assistants to the plant employing 1,000 or even 50,000 men. As the units increased in size attention was first centered upon the material and the methods of processing it in order that it should emerge from the plant as a product whose total cost should be such as to permit its sale at a profit in competition with articles designed to fulfil a similar want on the part of mankind.

From the days when commerce was born—from the dawn of history, before even the Semites got into Babylonia, down through the history of Carthage, of Venice, of Spain, and of Drake's England, down even until today—business has been called a "venture." A business venture has been an adventure in which some risked their lives and some their fortunes. The poor man has risked what he had—his life and his health, partly through love of action and partly for hope of gain—and the rich man has risked his gold and his ships for the sake of profit. As the world has become more law-abiding the risk both of loss of capital and of loss of life has become less until capital is ordinarily satisfied with 8 or 10 per cent and labor works for a livelihood. But the venture has always been undertaken—the goods, the ship, or the factory has

always been contributed through hope of gain—for the sake of the return on invested capital. This is as true of the widow who buys a share of Steel Preferred as it is of the man who sells his New England home in order to join the gold rush to Alaska.

Under the circumstances it is not strange that gain has been considered first. Wealth is scarce—because only a few have the energy, the wisdom, the power of self-denial, the desire, the ruthlessness, and the luck to acquire it. There are more poor people than rich people. The law of supply and demand forces those who have not to seek necessities from those who have. Therefore the poor have always worked for the rich and—in spite of the Russian experiment, which was more successful as a method for making the rich poor than the poor rich—will quite probably continue to take their orders from those who have the qualities necessary to the acquisition of capital. At any rate it is quite natural that the stability of capital and the return on capital received the first consideration as the world became industrial.

Awakening to Human Needs

As a result things were done, while mankind was learning the new game of production in large steam-driven units, which produced human derelicts who were a menace to society. The result was factory acts, labor legislation, and the awakening of a social conscience capable of protecting the poor. Formerly in the villages and in the small water-power shops the poor had been protected by personal contact with the wealthy. A cook in your own kitchen with diphtheria spurs the family to action. A workman a mile away in a slum, sick with the same disease, is not particularly alarming—until an epidemic comes. Then the health officer is called in, and public opinion demands the proper expenditure for isolation, sanitation, and education.

As a result of the awakening of the public, and particularly of the manufacturer and of the capitalist, to the effect of the large industrial unit upon the worker—as a citizen, as a factor in production, and as an industrial asset—attention was directed to the necessity of discovering some means of reproducing, under irrevocably altered conditions, the close contact between owner and employee which had existed in the days of the small shop in the small town where all worked and lived in close contact with each other.

Employment Management

The war—which forced labor into the strategic position which, under the law of demand and supply, capital had held before—emphasized every injustice and every inefficiency which had resulted from loss of contact between employer and employee. Labor turnovers of 500 and even 1,000 per cent—which meant that each worker in the factory was replaced and a successor was "broken in" and trained to the work at great expense due to loss of production and spoiled material, from five to ten times a year—were common. America, therefore, devised what was for this country an entirely new thing —"employment management."

Employers, at their wit's end because labor was spending its time in joy-riding from one plant to another instead of in working, welcomed every sort of impractical uplifter who called himself an "employment manager." The government gave six weeks' courses in employment management. All sorts applied, from draft-dodging ball-players and social uplifters who could lay claim to industrial experience, to ancient and mildewed foremen. Fortunately very few such were stamped with the government seal, but nevertheless enough of them became sufficiently familiar with the jargon of the profession to give voice to a lot of nonsense which the capable men are still trying to live down. Callow youths were en-

trusted with duties which would have taxed the powers of a diplomat and there were naturally failures.

Elements of Scientific Personnel Management

When the smoke and turmoil had cleared away there emerged a clean-cut and necessary professional man—the director of personnel—a man of the caliber of corporation vice-presidents—tactful, experienced, a psychologist, and a diplomat of wide technical knowledge. His duties, as they have developed, are shown in the tabulation which follows:

1. Employment direction—maintenance at the minimum of labor turnover and expense[1] of breaking in new employees.
2. Safety—prevention of loss by accident.
3. Sanitation and health—prevention of loss by sickness.
4. Education—improvement of employees' quality.
5. General service—extension of section 1.

1. Employment Direction:
   (a) Maintaining sources of labor supply from without the factory.
   (b) Analyzing demand, within the factory—maintenance of job specifications and list of immediate and future departmental requirements.
   (c) Interviewing the applicant—mental and physical analysis—looking up previous record, selling prospective employee the job he is fitted for.
   (d) Fitting the new employee to his environment—introduction to foreman, fellow-workers, physical surroundings, conditions, securing lodgings, etc.
   (e) Following the employee's progress—maintenance of individual records.
   (f) Insuring just treatment of employees—investigation of grievances, assistance in securing deserved promotions and raises, insistence upon penalties in proportion to misdemeanors.

[1]The cost of breaking in a new man varies from perhaps $10 on the lowest sort of labor to $50 and more on skilled men.

(g) Investigating and reducing absenteeism—investigation of home environment, attendance bonus.

(h) Transferring employees from one department to another.

(i) Discharging and laying off employees—investigation of causes. In co-operation with foremen—see later paragraphs.

(j) Investigating cases of employees who leave—persuasion of individuals not to leave.

(k) Maintaining a continuous statistical analysis of employment conditions within and without the plant—preparation of government reports, representing the company in labor matters and at conventions, etc.

(l) Advising the management as to changes necessary in the company's labor policy to keep the labor turnover at a minimum.

2. Safety:

(a) Analyzing possible and probable hazards.

(b) Providing guards and safety devices wherever practicable.

(c) Insisting upon the use of guards and upon reasonable carefulness—frequent inspection of all work and recreation places.

(d) Promotion of safety-first spirit—organization of safety committees, first-aid teams, competition between departments and plants, bulletins, lectures, etc.

(e) Analysis and report of all accidents—devising further preventatives.

(f) Following up accidents—to insure proper care and shortest possible period of disability, to assist in securing compensation, to secure suitable work at end of convalescence.

(g) Maintaining a continuous statistical analysis of accidents and their causes—acting as a clearing house for the best and latest safety practice.

(h) Advising the management in regard to safety matters so that the economic loss due to accidents will at all times be kept down to the minimum.

3. Sanitation and Health:
   (a) Physical examination of applicants and workers.
   (b) Re-examination of defectives and of employees exposed to industrial hazards—insistence upon transfer when necessary, follow-up of all cases.
   (c) Supervision of treatment of accident, surgical, medical, occular, and dental cases—first aid.
   (d) Preventive work—isolation of contagious diseases, inspection of water, sewers, ventilation, lighting, heating in plant and in homes, elimination of industrial disease hazards.
   (e) Investigation of absences.
   (f) Maintenance of a continuous statistical analysis of all cases of sickness and the probable cause, the treatment, and the result—serving as a clearing house for all medical data.
   (g) Advising the management in regard to health and sanitation matters in order to maintain economic loss at the minimum.
4. Education:
   (a) Keeping before the workmen the aims, ideals, and policy of the company—house organs, clubs, lectures, bulletins.
   (b) Keeping before the management and the plant executives the aims, ideals, and actuating motives of the workmen—foremen's meetings, committees.
   (c) General education of employees and their families in American ideals (naturalization, etc.)—libraries, bulletins, clubs, lectures on health, sanitation, safety first aid, etc.
   (d) Thrift education—mutual benefit and building loan associations, plant savings banks, thrift gardens (prizes).
   (e) Co-operation with industrial engineering department in educating new types of labor, women, etc., and in instructing employees by new methods—vestibule schools, etc.
   (f) Serving as clearing house for information required by management, executives, workmen, community, and government.

(g) Maintaining continuous statistical analysis of educational work and results.
(h) Advising the management as to policy.

5. General Service:
(a) Lockers and showers.
(b) Company restaurant.
(c) Commissary or company store—goods at cost, saloons.
(d) Boarding houses and hotels.
(e) Company houses.
(f) Company farm—vegetables at cost.
(g) Athletic teams—baseball suits, etc., furnished by company.
(h) Amusements—movies, theatricals, picnics, drum corps, play grounds, and camps.
(i) Insurance—life, health, burial, group insurance.
(j) Pensions.
(k) Profit-sharing.
(l) "Welfare"—all the way to aesthetics.[2]
(m) Statistics of a general nature.
(n) Advice to management, general.

Shop Politics

At first the troubles of the director of personnel were multitudinous. The propaganda "listens well" to the usual line executive until some misguided employment manager starts to insert an altruistic paw into that vital section of the plant mechanism known as "shop politics." The time-worn executive then emits a loud howl, arises on his hind legs, and damns all personnel workers and uplifters unto the third and fourth generation. The common attitude of the line—whether workman, foreman, or superintendent—toward ill-defined staffs was once clearly expressed to me by an exceeding wroth Hibernian who explosively poured forth certain convictions, the mildest and most printable of which was to the effect that: "He never worked in such a creator-condemned hole, where

[2]One iron foundry arranged for their moulders to eat their lunches in a specially constructed rose garden equipped with canaries in cages.

an honest son of Ireland couldn't tell which boss to be good to."

Moriarty's language may have been crude, but his conclusion did not lack finish. Furthermore, it represented a law of human action which antedates the pyramids—the law of reciprocity—under which the weaker propitiates the stronger in time of peace in return for protection in time of war. This is one of the fundamentals of organization as well as of survival. Rome existed under it, feudalism improved upon it, and it has reached its full flower in municipal and industrial politics in America.

When, therefore, the foreman or the superintendent is told that the employment manager has been introduced into the organization to assist him, by relieving him of the trouble of hiring and firing and of rate-raising, he is nearly as pleased as the man who is relieved of the burden of his wealth by a nocturnal visitor with a bull's-eye and a gat. Up to that time about the only things that had made his life in the factory worth living was his power to cast into utter darkness the impudent, the lazy, and the "snitch." The prestige so acquired was one of the things that repaid him for various unpleasant features of existence—such as the fact that piece workers under him made more money than he did. There was solid personal satisfaction in having unanswerable repartee in his possession when dealing with the "fresh" and the sullen. The lazy were, of course, virtuously fired in the interest of efficiency—of which he was sole judge. The snitch—a creature beyond the pale, as any workman or any non-paying state guest will tell you—must be exterminated for the good of society. In supplement to these very human pleasures the exercise of altruism furnished a pleasant thrill. The satisfaction of increasing the weekly income of a faithful henchman could be equaled only by the glow of well-being which permeated his entire physique when Tony bowed his "Tank

you, boss," or Mike grinned his "An shure, ye are a dom fine man to wurk fur."

"Pull" and "Czarism"

Even the most conscientious have their human weaknesses. We all like to help humanity—that is why the uplift market is so glutted that the man who would save souls comfortably must marry a rich wife—and the loss of these rights, to earn which he worked hard and faithfully many long years, is a serious blow to the foreman who has forced his way to a position of standing in the community, in spite of lack of education. In addition, the man who has fought his way to a foremanship has had ingrained in his nature this law of reciprocity. He perhaps gained his own first step by doing a favor for some person who had the ear of someone in authority. If Lord Chesterfield could write a book which has served as a handbook to practical social success since before the Revolution, the burden of whose message has been "neglect to please no one," and if every old-school pillar of society can continue to enthrall ambitious youth with speeches whose slogan is "politeness, industry, and economy," we must not blame the workman who would rise for building up, with meticulous care, what he calls a "pull" with his superiors.

In consequence, when he becomes a boss he feels that his prestige rests upon what he is able to do for his inferiors. As William Travers Jerome once said, "It is all very well to try to reform the city government by writing high-brow articles and delivering high-brow speeches, but how many people in Hamilton Street read the *Atlantic Monthly?* The fellow who gets the votes lives over Mulligan's saloon and gets Willie out of jail and finds Rosie a job. Favors received cut more ice than fine sentiments." In consequence the proposal to cut away the roots of the foreman's plum tree—removing the right to hire and fire and raise rates—and to

graft upon them the structure of the employment manager, is viewed with scant favor by the industrial boss who has been accustomed to have his department touch its forelock and with one voice chorus, "Good morning, King," in reply to his daily "Good morning, men."

The inexperienced employment manager is prone to attribute this feeling on the part of the foreman to something vicious and to label it "czarism." I have actually heard half-baked "employment managers" tell the foremen that they expected to stamp out czarism and injustice to the workmen, and I have heard men who should have known better tell a convention that it was the mission of the employment manager to put a heart into the general manager. Neither foremen nor general managers like to be told that they are tyrants and to have it hinted that they are equipped with a gizzard instead of the usual cardiac structure. Consequently such an attitude on the part of a man who enters an industrial organization can result in only one thing—organized opposition.

Inefficiency and Wilful Misinterpretation

Aside from all personal feeling in the matter, lack of knowledge of "who to be good to" on the part of the workman leads to very real plant inefficiency. The average workman requires much education before he understands any sort of functional foremanship. Where authority is divided he plays safe for a long time by consulting "both bosses" before he acts, since past experience has taught him that the first result of taking orders from the wrong boss results in personal chastisement from the foreman who feels affronted that his authority should be doubted. This is pure feudalism, of course, but it has its roots deep in human nature and the result of a henchman changing overlords has more than once rocked entire kingdoms before the barons in question ceased their

avenging forays. The result then of the workman or the subforeman misunderstanding functionalized control—and provision for every eventuality often requires standard practice instructions as voluminous as the common law of England —certainly leads to loss of time in getting into action when two or more bosses must be consulted, and may mean a local industrial revolution.

In addition, lack of discipline in a foreman's department leads to the wilful misinterpretation of orders, to certain sorts of loafing—since it is not always possible to make even piece rates or bonus all-embracing—to industrial accidents, and to various other things which decrease quality and increase the cost of production. Where such things occur the greatest inefficiency of all lies in the fact that the whole thing is preventable.

Standard Practice Instructions

The first step is a complete *written* definition of the duties and powers of the employment department wherever there is contact with the line organization. These will necessarily vary with the size and sort of industry. Perhaps a typical instance, however, would be represented by a plant employing less than a thousand men, whose employment department consisted of a director of personnel and two or three clerks. Under such circumstances the following standard practice instructions, signed by the general manager, have been found to relieve much of the tension occasioned by the delegation to a newcomer of long-cherished privileges:

1. The Employment Department is hereby authorized to "hire and fire" all employees up to the grade of assistant department foreman.

2. Hiring shall be interpreted to mean securing employees, suitable in ability, in sufficient quantity, to perform effectively the work scheduled to the operating departments. It further implies the assumption of the responsibility of accepting or

rejecting every prospective employee, by the Employment Department, which has time and is equipped to do this work carefully.

3. Although the final decision as to whether a man or woman is to be hired or not must rest with the Employment Department unless appeal is made to the management—it is desired and expected that the various department heads render every assistance at all times both in securing the work people required and in advising as to the suitability of such men for the work for which they are required.

4. Since such executives are responsible for the efficiency with which their departments are conducted, and since they are on bonus as well as the men, no foreman is required to keep a man in his department who is doing unsatisfactory work or who destroys the effectiveness of any crew. Such an undesirable should be returned to the Employment Department and detailed explanation of his shortcomings made, preferably in writing.

5. In the case of skilled or semiskilled men, foremen should fill out the Leaving Notice Blank and hand it in at the Employment Office before the man is asked to leave the department. In case of insubordination, drunkenness, or other flagrant offense, the offender's foreman should take him to the Employment Office immediately and if necessary arrange for his removal from the premises at once.

6. It is, of course, assumed that every foreman will give each man sent him a fair trial, which implies:

(a) Adequate instruction in the work the new employee is expected to perform (assuming there is no vestibule training school).

(b) Allowance for mistakes due to unfamiliarity with the work and with his new environment.

(c) Opportunity in case of preliminary failure to try other work for which the novice may be fitted mentally and physically, whenever circumstances permit.

(d) Absence of prejudice on the part of both foremen and co-workers on account of race, sex, or previous record.

7. It is further assumed that all executives will make full allowance for existing labor conditions when they are such as to require the exercise of unusual patience with the

quality or quantity of labor delivered—and also with delays which such conditions render necessary. Attempts to blame the Employment Department for conditions due to the general labor situation will not be tolerated.

8. Full co-operation with the Employment Department in locating sources of labor supply through present employees, together with suggestions as to methods of obtaining labor, are at all times desired and expected from those in charge of the various crews and departments.

9. Whenever a new man is required to fill an expected or an existing vacancy requiring skilled or semiskilled labor the foreman should make out a Rquisition for Help, and should turn it in at the Employment Office as far in advance as possible. This applies for the present to such men as engine tenders, machinists, machinists' helpers, electricians, pressmen, moulders, crew leaders, first assistants, etc.

10. Demands for common labor will be supplied from the reservoir crew in accordance with the existing procedure, which is as follows:

(a) All men needed for the work laid out by the Planning Department at 1:30 P. M. of the day before the work is begun must be requisitioned by man-number, before 3:30 P. M. Schedules are turned in by foremen and crew leaders to the Dispatch Office.

(b) These foremen will enter the man-number of all men wanted for the next day opposite the planned job. The numbers of all men working on such jobs the day the schedules are handed in, but who are not wanted again, must also be entered but with an *X* (extra) marked after their number. Similarly men previously scheduled but absent the day the new schedule is made up must be marked with an *A*. If additional men are needed on a crew,[3] indicate the fact by entering a zero (*o*) in the space you wish to have filled with a man-number.

[3]This is in line with the conciliation policy voiced at the 1919 meeting of the National Association Employment Managers' convention, at which P. J. Reilly described the Dennison Manufacturing Company's plan for training foremen in the employment department and then delegating to them certain elements of employment work and the keeping of certain records upon their return to their respective departments. Similarly the writer has found it advisable to delegate to foremen certain elements of planning and to have them keep certain sorts of records. Such records as schedules for common labor are more valuable when prepared by someone in continuous personal touch with the workmen than when kept by some clerk in an isolated planning department. This plan interferes in no way with the application of written standards.

(c) The dispatch clerk, in whose hands all Schedules must be placed by 3:45 P. M. of the day previous to the morning the work planned is to be begun, will make out service cards in accordance with the Schedules but will place the cards of all men marked *X* in the Extra Man File, omitting department, operation, account and machine number.

(d) At 4:30 P. M. the Employment Department will go over the schedules listing the men required by the different crew leaders (as indicated by the *O*'s). The department will then select the best man to fill each such vacancy from the availables whose service cards are in the Extra Man File, marking in the department, operation, account and machine numbers and will place these service cards in their proper man-number pocket on the dispatch board so that they will be distributed by the dispatch clerks when the men call for their service cards in the morning. As the cards are marked the Employment Department will replace the *O* shown on the schedules with the number of the man selected to fill the vacancy, so that the schedules when returned to the dispatch office files will be a true and complete statement of just what is planned for the following day.

(e) Foremen who, on the morning the work so planned begins, find themselves short a man, owing to the unexpected absence of an employee, will at once apply to the Employment Manager for a man to fill his place. Such men will be supplied from the reservoir crew. (Incidentally a glance at the dispatch boards half an hour after the plant starts gives the Employment Department a graphic picture of just how many men are absent from each department).[4]

11. It is expected that whenever executives know that an unusual number of men will be needed in the future the longest possible notice will be given the Employment Department so that the reservoir crew may be filled to meet the need. This is necessary in order to prevent labor shortage and also to enable the work for the reservoir crew to be planned effectively.

12. Emergency vacancies occurring suddenly within a department will, of course, be temporarily filled by the foreman rearranging his men to best advantage and then securing

[4]See Chapter IX.

from the Employment Department the best man available to fill the final vacancy. In order to cause the least amount of disorganization at such times all foremen should be urged to train "understudies" for all their more important jobs so that continuous and efficient operation is not at the mercy of some mischance, such as a case of sickness.

13. In training understudies the foremen and men must be made to see that not only is steady operation and bonus insured under the system but also that promotion is more likely if someone is prepared to take over an individual's present work when his opportunity arrives.

14. It is desired that attractive vacancies be filled from within the company's organization when possible and the Employment Department is prepared to assist in the work of selecting and training understudies and to that end will, with the assistance of the different foremen, list the various positions which each man is capable of filling.

15. All plant executives are expected to assist the Employment Department in picking the best men available for all emergency vacancies.

16. All permanent transfers of men within a department should be reported to the Employment Department so that a complete and detailed record of each man's experience may be kept.

17. All transfers of men from one department to another should be made only with the knowledge of and permission of the Employment Department.

18. All transfers of whatsoever nature, in any way affecting the work laid out by the Planning Department, must be made only with the knowledge of the chief dispatcher—and with the permission of the superintendent, if of an important nature.

19. It is expected that the Planning Department and the Employment Department will work as a unit, the former keeping the latter fully informed of all moves affecting the output which are likely to affect employment policies.

20. Foremen are under no circumstances to take men from other foremen without the knowledge and permission of the Employment Department, nor are they to offer inducements to men employed in other departments to leave such depart-

ments without the knowledge and permission of the employment department, which will in every case take the matter up with all foremen involved. Transfers of importance should be discussed with the superintendent.

21. Promises as to rate or work, except as arranged with the Employment Department, must not be made to prospective employees by the plant executives. There is no objection, however, to any foremen stating current rates to acquaintances or applicants outside of business hours and of offering to speak a good word for them at the Employment Office. Such action is welcomed as an assistance to the maintenance of the company's force of effectives.

22. No rate raises will be honored by the Time-Keeping Department without the written permission of the superintendent, the assistant superintendent, the Industrial Engineering Department, and the Employment Department, the Rate Change Notice being used for the purpose. This notice may originate as a recommendation in any of the departments named. (Note: This leaves the line executives, who are responsible for production costs, in control of rate raises, but at the same time insures the man's efficiency being checked up by the Industrial Engineering Department and his personal record being brought to bear on the question by the Employment Department.)

23. Announcement of a raise shall in every case be made to the workman by his foreman. (This keeps the workmen notified as to "who to be good to.")

24. The aims of the Employment and Industrial Engineering Departments and of the line executives are identical in that they all exist for the purpose of turning out *continuously the largest quantity of first-quality product at the least cost.* An adequate force of contented employees who will remain in the Company's employ after they have become skilled is essential to this result. The full and permanent co-operation of every employee is required and all department heads receiving a copy of these instructions are expected to set the example and to work in harmony with each other.

It is not in any way intended to imply that these instructions will cover every situation. Each plant must be studied

separately and the personnel of the existing organization analyzed in detail. It has been our experience, however, that the reduction of the responsibilities of each department to writing, with due regard for the existing psychology of industrial human nature, together with the patient education of all concerned so that they act principally on such motives as they are willing to confess before their associates, will remove most of the friction attendant upon the reorganization of a plant to admit the specialist in personnel.

So much for the duties of the director of personnel and his relation to the plant executives. We have endeavored to handle the tabulation of elements from the standpoint of their value to industry, from the profit-producing standpoint—immediate or future[5]—because that is what ultimately determines the survival of any addition to modern industry. The last four sections—Safety, Sanitation, Education, and General Service—will be dealt with in further detail in later chapters.

Determination of Base Rate

Employment direction, while intimately connected with the elements described in the last four sections, represents the activities of the director of personnel which correspond to those of the industrial engineer or the production manager in the standardization of materials, in planning, dispatching, and in working out the time element in rate-setting. The production manager deals with materials, transportation, ma-

[5]We are deliberately disregarding the obvious copybook maxim arguments, on the assumption that everything which is good for humanity is productive of profit to industry in the long run. For instance, everyone of any intelligence knows that unhealthy working conditions in a generation or two produce workmen who consume nearly as much as healthy workmen but whose productive ability is far less. Similarly rank injustice results in high turnover (the "individual strike") and in expensive labor troubles. Aside from all moral reasons it *pays* to treat labor justly. It is taken for granted that the reader is already familiar with the religious, ethical, and moral grounds for treating his fellow-men with respect. I say this because the safety-first propaganda at a certain safety-first convention which I once attended consisted almost wholly of an appeal to the employers' sense of duty. As a matter of fact an appeal to a man's sense of duty is as great a reflection upon his character as an appeal to his sense of honesty. Such things are taken for granted among the right sort of people and the time sometimes devoted to long pious statements of high motives is thereby saved for consideration of the essentials.

chines, and with methods and time of processing. The director of personnel deals with the workman first as a citizen; and secondly as a factor of production.

In order to contribute to the success of the business—which depends upon the production of goods at a cost low enough to meet competitors' prices—the duty of the director of employment is to furnish the factor which he controls at the lowest

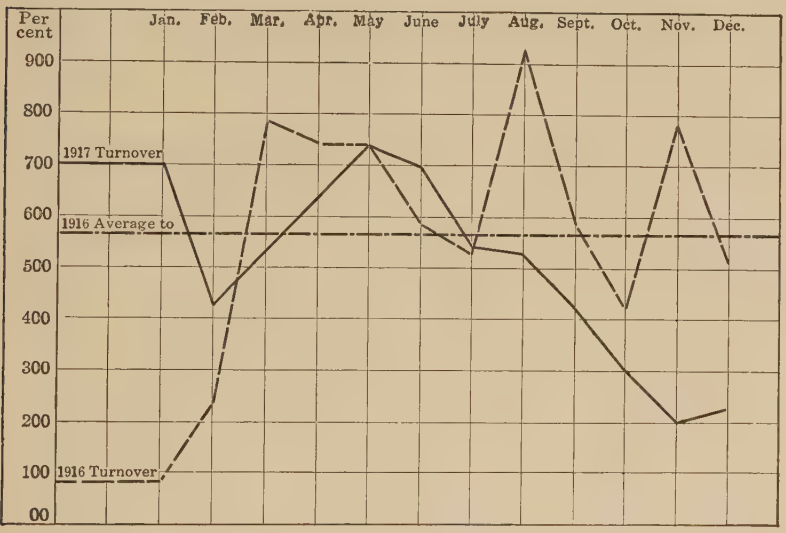


Figure 55. Chart Showing Actual Result of Personnel Direction in a Large Plant During the War

The work started in May, 1917, and the installation was completed in October. From then on—through 1918—the turnover varied from 200 to 250 per cent. The majority of the workers were unskilled and this final turnover was low for the industry.

price consistent with operating efficiency and with the permanent welfare of the business. This means that he must secure and maintain a working force which is permanent (having a low labor turnover) and which is of a quality that will produce the greatest amount of high-quality goods at the lowest cost per unit. From this standpoint authorities are now pretty well agreed that high-priced labor is in the end the cheapest labor. Under any circumstances it is the duty of the em-

ployment director to advise the management what base rate should be paid in order to secure the grade of labor best suited to the particular business with which he is connected.

This requires an intimate knowledge of:

1. The local demand and supply of labor.
2. The wages being paid locally for different grades of labor.
3. The other attractions[6] that competitors in the local labor market are offering employees.

Use of Charts

This information should be arranged statistically on charts. The first chart should show the weekly labor balance—the "inflow" versus the "outflow"—at the plant. When the balance goes into "the red," investigation is automatically forced. This chart should also show whether the loss is made up of men who have been employed less than a week, a month, 3 months, 6 months, a year, etc., as the loss of old employees indicates a much more serious condition than the loss of new men who may be merely trying out the plant or who may be of the kind who work only when broke. It is, of course, assumed that this information will be examined in the light of the conclusions which have been drawn from the monthly charts showing the total plant turnover and the turnover by departments.

The second chart should show the wages being paid in a dozen local industries where working conditions are similar to those in the one in question. This information can be secured from the men who apply for jobs each day.

The third chart should tabulate the non-wage attractions of the industry in a column at the left and should rate opposite

[6]This includes working conditions—sanitation, lighting, etc.—housing conditions, amusements, co-operative buying, etc. One firm I know of, during the war gained an advantage over competitors in the local labor market of nearly a dollar a day by establishing a co-operative store at which goods were sold employees at cost.

a dozen local competing industries, according to an arbitrary percentage scale similar to that used in rating United States Army officers.

If the employment director studies these charts closely each week and keeps in touch personally with conditions throughout the plant he will be in a position to advise the management just what base rate must be paid for labor in order to turn out a product of the highest quality at the lowest cost per unit. Furthermore, he will be able to back up his statements with facts which will convince the most hard-headed managements, intent upon the satisfaction of their constituency with large, regular, and frequent dividends, and upon the safety of the investment. The safe and economical, if not very heroic, course is to keep just ahead of the middle of the procession of local competitors when wages and other attractions are going up, and just behind the middle when they are going down, because the tail end of the procession is having labor troubles when wages are rising and the vanguard is having trouble when wages are going down. Obviously this has nothing to do with the solution of the ethical question as to how much labor should be paid. That is as difficult as it is to decide how much bacon the farmer in the rural market, who has slaughtered a hog, should ethically deliver for an egg to the farmer whose hens are laying well. The question is settled by bargaining, not by ethics.[7]

Fluctuations in Living Costs

Violent and sudden fluctuations in living costs, such as those which took place during the war, can be met by an agreement to raise or lower wages in proportion to the rise and fall of the various commodity indexes—such as those

[7]The social conscience of the community would, however, be aroused if either farmer kicked the other below the belt in the course of the bargain. The same thing happens in the case of a strike, because public opiinon asserts itself whenever either side indulges in "dirty work."

issued by the Department of Labor, Dun, Bradstreet, etc.—although a chart showing local living costs in the districts in which the workmen actually live is much safer. There is nothing final about this plan, however, as it assumes that the base rate upon which fluctuations are figured was correct. As a matter of fact that rate itself was undoubtedly established by bargaining—individual or collective, depending upon whether the plant was unionized or not—not by ethics.

Qualities Required of Personnel Directors

The problem of providing and maintaining an adequate force of efficient and satisfied workmen and of translating their needs and desires to the management in a manner which will serve the interests of all parties, labor, capital, and the community, as faithfully as did the personal contact between master and man in the small shop of a hundred years ago, is not an easy one. The director of personnel must be a man of broad vision. He must thoroughly appreciate the viewpoint of capital, management, and workman. He must have the courage to fight for what is right. He must know how to fight tactfully and successfully—how to back up his statements with facts. He must be human and he must be systematic. He isn't very common, in spite of the fact that nearly every plant in America has a clerk whom it calls an "employment manager." But he is one of the most important factors in modern industrial organization and the future of the capitalistic system is to a large extent in his hands.

Personnel Direction in France

Before I left America a professor in one of our eastern universities asked me to find out if employment management —something which we were under the impression we had bestowed upon civilization during the war—had been introduced into France. He said he had written various booksellers

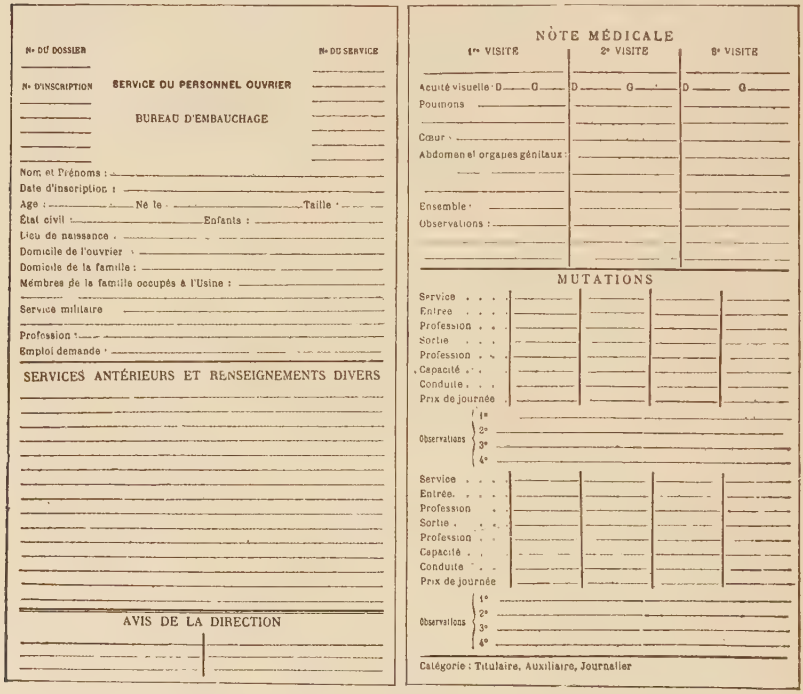
abroad but had been unable to secure any literature on the subject. At one of the Schneider establishments I spent an hour in one of the largest and best equipped employment departments I have ever seen. As we finished I asked the director of personnel—*directeur service personnel ouvrier*— how long the department had been in existence. *"Toujours,"* he replied—"always"—meaning somewhere about the time of the American Revolution! The reason my friend had been unable to obtain any literature on employment management was because it was such an old story and was taken so much as a matter of course that the French had stopped writing about it.

Employment Methods

At the entrance of nearly every French plant of any consequence is the *bureau de personnel ouvrier,* over which presides the *directeur de service personnel ouvrier.* Here the *chef d'embauchage* and his assistants hire the men, grant them leave, and fire them. When a man applies for a job he is questioned and the answers are inscribed upon a *dossier* similar to Figure 56. It will be noted that they do not miss much, either mental, physical, or moral—especially after they have been through the man's police record, which he must always carry with him wherever he goes in order to avoid arrest and imprisonment and which gives a complete record of anything of any importance which has ever happened to him. The record of his military service is similarly complete and has accustomed him to physical examination. Furthermore, men are not hired until several of their previous employers have been heard from. Altogether the bad actor hasn't much chance.

If the man passes these preliminary tests he is tested on actual work by the foreman of the department in the presence of a man from the employment department. If he makes good on this he is given a job on probation and eventually becomes a full-fledged employee. In case a workman proves unsatis-

factory in one department he is transferred to another by the employment department. Men who prove unsatisfactory in all departments or who are guilty of serious breaches of discipline are sent to the *directeur de service* and his assistants to be discharged. Systematic soldiering is discouraged by dis-



N° DU DOSSIER

N° DU SERVICE

N° D'INSCRIPTION

SERVICE DU PERSONNEL OUVRIER

BUREAU D'EMBAUCHAGE

Nom et Prénoms :
Date d'inscription :
Age : Né le : Taille :
État civil : Enfants :
Lieu de naissance :
Domicile de l'ouvrier :
Domicile de la famille :
Membres de la famille occupés à l'Usine :
Service militaire
Profession :
Emploi demandé :

SERVICES ANTÉRIEURS ET RENSEIGNEMENTS DIVERS

AVIS DE LA DIRECTION

NOTE MÉDICALE

	1re VISITE	2e VISITE	3e VISITE
Acuité visuelle : D	G	D G	D G
Poumons			
Cœur			
Abdomen et organes génitaux			
Ensemble			
Observations			

MUTATIONS

Service				
Entrée				
Profession				
Sortie				
Profession				
Capacité				
Conduite				
Prix de journée				
Observations	1re			
	2e			
	3e			
	4e			
Service				
Entrée				
Profession				
Sortie				
Profession				
Capacité				
Conduite				
Prix de journée				
Observations	1°			
	2°			
	3°			
	4°			

Catégorie : Titulaire, Auxiliaire, Journalier

Figure 56. French Application Blank (face and reverse)

charge—after it is proved to the workman, by another workman, that the job can be done in a certain time.

Industrial Relations

As a result of this system you find the grandsons of the original workmen, who were hired when the plant started, still on the job. Furthermore the normal labor turnover is 10 or

12 per cent per year. During the war this increased somewhat, but at such plants as that at Le Creusot, where good houses were available and coal plentiful, it remained around 20 per cent. In the forgeshop at Le Creusot, which employes 3,800 men, the turnover was running at 10 per cent and at 15 per cent in the rolling-mill at the time of my visit.

The employment of women on all sorts of work during the war developed some interesting problems with which the personnel department had to deal. In one plant the *chef de service* told me that the foremen had to be specially trained in diplomacy.

> It is necessary for the foreman to speak little when the women in the department are many, Monsieur. A hard forewoman also is a much better director of the work than a gallant man. Furthermore it is advisable for the superintendent to recommend the largest wages for the ladies from the largest families. It is well also to hold converse with the most acidulous ladies and to discharge the beautiful ones, is it not, Monsieur? It was in fact a most difficult industrial period, Monsieur, but then it was the war.

Italian and German Methods

In the larger Italian plants the director of employment does the hiring and firing in a manner similar to that in France. The usual practice is for the foremen to recommend discharge but for the employment department to do it.

In Germany the usual practice is for the employment department to secure such men as are required from the government employment offices. Their record is then entered on a card (see Figure 57) and the candidates are sent to the foreman to be tried out. If they prove unsatisfactory they are discharged. In one large plant I found that it was the rule to send an unsatisfactory workman to one of ten departmental managers. The employment department usually handles the workman's insurance records and the physician, who by law must

Kontr.-Nr.

Zuname Vorname

geboren am 18 in
Ort Land

gelernt beschäftigt als verheiratet?

in AEG Betrieben von bis Kranken-Buch Nr.
" " Werkzeug-Marken-Nr.
" " Garderoben- Nr.

Eintritt am mit Pfg. Stundenlohn

seit
neuer Stundenlohn

Wohnung

Austritt am Grund

Figure 57. (a) German Employee's Record (face)

Strafen

Tag	Grund	Tag	Grund

Figure 57. (b) German Employee's Record (reverse)

spend at least an hour a day at the plant, sometimes holds his clinic in a section of the employment department.

One of the peculiarities of the German system is a long list of penalties for infringement of various shop rules. For instance in one plant it costs 15 pfennigs to come from 3 to 5 minutes late. If you are from 6 to 10 minutes late it costs you 25 pfennigs—nearly half a cent. If you don't stamp your clock card you are penalized 25 pfennigs, and so on through a long list. About the most extravagant thing you can do is to "smoke in repetition in the courts or buildings," which costs half a mark. All these penalties are recorded upon the back of the employee's record card (Arbeiter-Personal-Karten) under the heading of "Strafen" so that it is possible to see just how law-abiding a person he is at any time.

A similar system is in use in a number of taxicab companies in America in which a definite and worth-while bonus is set up and then diminished by various penalties for infringement of rules which vary from "wearing non-uniform garments" to "not assisting elderly people, women, children, and cripples" and "chewing tobacco while on duty." Theoretically a workman is better off if he knows just what disobedience is going to cost him than if he never knows whether the boss when he catches him smoking will fire him or ask for a cigarette. Actually there is a popular prejudice in America against fines and against the "tattling" which is necessary if fair and complete records are to be kept.

In Germany very complete instruction books are furnished the newly engaged workmen, which contain full information in regard to what is expected of employees entering the establishment. Employees' record cards of various sorts, discharge tickets, and leaving tickets such as are found in America are in use. (See Figure 58.) There are also special forms covering war-time relief matters—as the allowance of 9 marks for an employee's wife and 18 marks per child each week, etc.

Personnel Direction in England

Going over on the "Mauretania" I sat at the table of the chief staff engineer, a man whose duty it was to hire, fire, and otherwise discipline the mechanics and stokers employed below. The chief engineer of the ship attended to the purely technical phases of keeping the machinery in motion, while

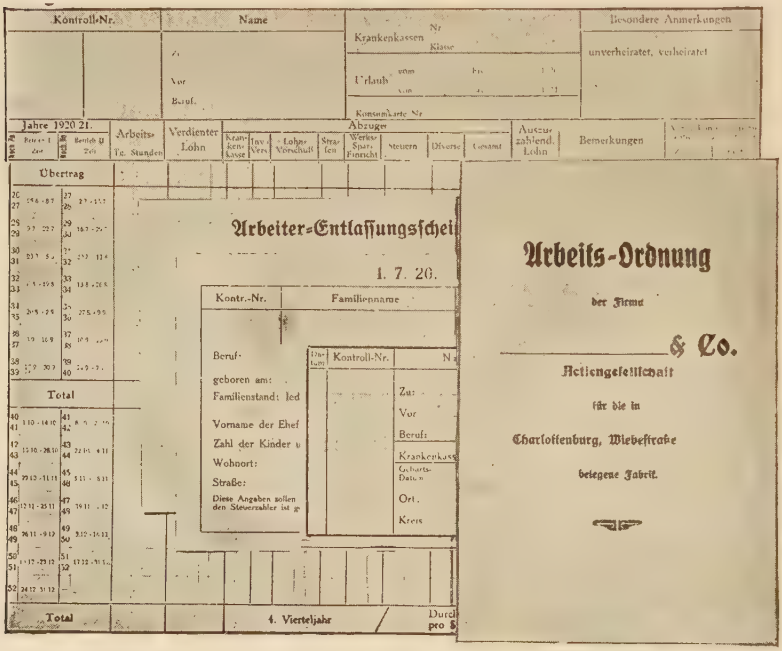


Figure 58. Forms Used in Personnel Direction in Germany

my friend was the director of personnel—a part of the organization that developed on the larger ships of the Cunard Company during the war. In a large steel plant in England the principal assistant to the works director told me he did not believe in employment management or personnel direction as practiced in America. A brief discussion of his duties developed the fact that he was director of personnel without being

aware of the fact. He had simply run across a few of the ridiculous statements made a number of years ago by some of the uplifters who fancied themselves as leading industry out of Egyptian darkness into the Promised Land and had rejected the whole thing as nonsense.

Well-organized employment departments—as such—are rarer in England than on the Continent. There is quite often a director of personnel who attends to everything except the hiring and firing. Very often he is known as the "educational" or "safety director"—as he sometimes is in America.[8] Such men are more than likely to tell you that employment management, as practiced in America, "would never do with us, because taking the right to hire and fire entirely away from the foreman would ruin discipline." When they find that this phase of employment management was only transitory in America (see section, "Standard Practice Instruction," in early part of this chapter) and that, as really practiced, the foreman has absolute authority in his department, they are quite willing to admit that employment management is perfectly feasible.

In fact the right of discharge was taken away from the foreman in a number of English industries years ago, although I believe that the condition in most industries in Great Britain is much as it was in America ten or fifteen years ago, except perhaps that thorough unionization gives the individual workman a certain amount of protection against the arbitrary and frankly brutal type of foreman. Specific clauses providing against "victimization" are at any rate usually inserted in most treaties of peace after strikes.

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[8]Comparison of programs of the annual meetings of the National Safety Council, the Industrial Relations Association of America, the National Association of Corporation Schools, the Society of Industrial Engineers, the Taylor Society, the American Society of Mechanical Engineers, and of some of the other national societies interested in hygiene and education will show that the area of the fields of industrial activity of the various bodies which overlap is greater than the area which belongs distinctly and wholly to any single professional activity. Fortunately this has so far resulted in co-operation rather than jealousy and an attempt to establish caste barriers.

Some Actual Practices

In one plant employing over 5,000 people, which is considered a model of enlightened management and which possesses a good many of the elements of scientific management, foremen have not been allowed to fire employees for a good many years. Offenses against discipline are dealt with by a tribunal made up of management and employees. Personal service records are kept of all employees, upon which are entered all offenses and all constructive suggestions. These are consulted when raises, promotions, or discharges are considered. Transfers from one department to another are made by the plant superintendent's office. New employees are secured from the labor exchanges and certain tests and a medical examination are given. After a period of instruction by the educational department the candidates for jobs are put to work on probation. Very complete rule books are presented to new employees. The plant has an annual labor turnover of 11 per cent.

At another plant discharges are made on recommendation of foremen to a director of the company. The plant has a combined employment and educational department under the supervision of a director. Increases in pay are made on the basis of personal record cards every six months on regular dates. Tests for new workmen were being devised at the time of my visit. The printed works rules set forth principally the various welfare activities open to employees. A money bonus—up to 3 days' wages—is paid for punctuality. Out of 18 departments 9 had had neither a lateness nor an absence for a year.

The director of personnel at a large steel plant was in charge of all the phases of industrial relations—schools, safety, labor committees, etc.—which such a man would supervise in America, except the hiring and firing, which was done by the foremen. At another steel plant in which there were no

APPLICATION CARD. — **EMPLOYMENT DEPT.**

APPLICATION	WRITTEN	PERSONAL	SUGGESTED BY	TRADE, POSITION, OR WORK MOST SUITABLE
DATE				
FULL NAME OF APPLICANT (SURNAME FIRST)			ADDRESS IN FULL	
AGE	DATE OF BIRTH	SINGLE OR MARRIED / No OF DEPENDENTS	ANY PHYSICAL DEFECTS	
WAGE WANTED	WHEN ABLE TO START	TRADE UNION / WORKED HERE BEFORE IN DEPT	EVER RECEIVED COMPENSATION?	

	PLACE	PERIOD	COURSE	CERTIFICATES GAINED, OR EXAMS. PASSED	BEST SUBJECT	WORST SUBJECT
SCHOOL						
EVENING SCHOOL						
APPRENTICESHIP						

PRESENT AND PREVIOUS EMPLOYERS	POSITION	PARTICULARS OF WORK DONE	WAGES	LENGTH OF SERVICE	DATE LEFT	REASON	REFERENCES

Figure 59. (a) An Application Card Used in England (face)

PHYSIQUE, ETC.	ACTIVE	STRONG	MOUTH BREATHER	FLUENT	WELL DRESSED	GOOD TEMPERED	CONFIDENT
	TALL	HEALTHY	EYESIGHT	TIDY	CHEERFUL	TEMPERATE	LIKELY TO CONTROL OTHERS
EXPERIENCE, ETC.							
MANNER							
GENERAL IMPRESSION AND REMARKS							
ANY RELATIVES WHO WORK HERE							

RESULT

TO START IN DEPT.	HOURLY, WEEKLY OR MONTHLY PAID EMPLOYEE	INSURABLE PT. I.	RATE	AGREEMENT	INTERVIEWED BY
DATE	GRADING SYMBOL	INSURABLE PT. II.			

Figure 59. (b) An Application Card Used in England (reverse)

evidences of personnel direction of any sort and where safety engineering, works council schemes, and the like were considered impractical and theoretical, absenteeism ran from 4 to 10 per cent in different departments. Morale was exceedingly bad and the labor turnover was not figured.

The most complete industrial relations department I encountered was in a large plant famous for its progressive and successful management. The absenteeism averaged 2½ per cent and the annual turnover 25 per cent. Each employee's record was kept in a separate folder on the outside of which were printed the more important facts in regard to him. Inside this were separate cards covering his rate record, attendance record, wage deduction record (for goods purchased, etc.), wage record, application card, etc. The employment department also took care of departmental transfers, filled requisitions for new employees, and took care of the various educational, safety, and welfare interests. In fact the department was quite as well organized and complete as any I have ever encountered, as will be seen by reference to the forms shown in Figures 59 and 60. At another plant employing 8,000 people, safety and welfare were especially well organized, although employment was still largely in the hands of the foremen. The labor turnover amounted to 27 per cent annually. At another plant the educational feature predominated.

Restoration of Personal Contact

There is no question but what the tendency in England is toward the restoration of personal contact between employer and employee through industrial relations departments under some type of director of personnel. He is variously named and anything that savors of weakening the foreman's authority is regarded with great suspicion, but the progress toward specialization is steady. We have already mentioned the removal of executive offices from London to the factory cen-

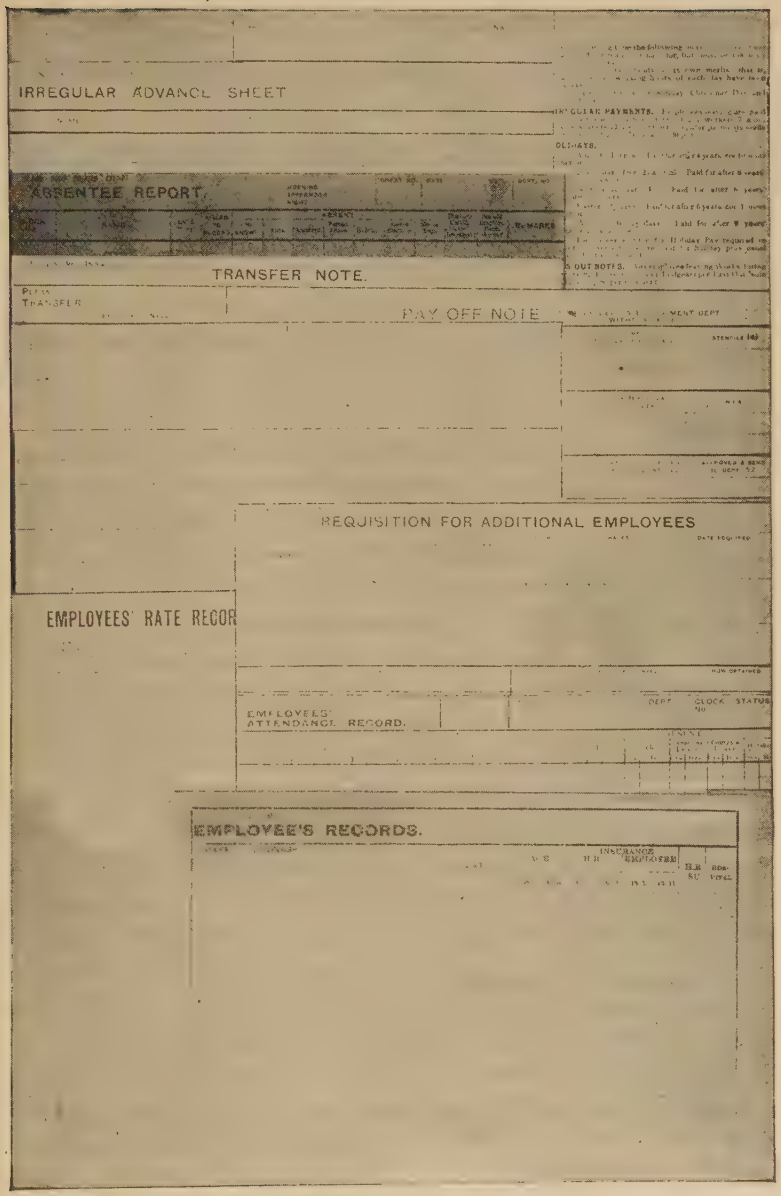

Figure 60. Forms Used in an English Employment Department

ters. That is simply another phase of the trend toward the restoration of personal contact.

Personnel direction—employment management, safety, and welfare work concentrated under one or more specialists—is simply the natural development accompanying the growth of the industrial unit from the four- or five-man shop of Franklin's day into the vast aggregation of workmen which exists today. It is the method of restoring personal contact between worker and owner. The more nearly the principles which guided the old workman-owner and his employee in their relations—mutual respect, fairness, and real democracy—can be preserved, the less class hatred, industrial warfare, and all that makes for mutual loss and sorrow will exist.

CHAPTER XIV

ADMINISTRATIVE AND EXECUTIVE CONTROL

Influence of Stockholders

Recently I heard a group of very able educators discussing the tests that were given army officers, from the standpoint of their use as a gauge of ability for industrial executives. The charts shown indicated that the proportion of minds which yielded a high intelligence test increased as the rank of the tested increased—that there were more class A minds among the majors than among the lieutenants, the corporals, or the private soldiers. It was argued that an army officer was an executive—why not then apply the army tests to industrial executives? Some time that may be possible but it is doubtful if the higher executives, the administrators, will be so chosen until the men who own the industries are similarly chosen.

A dozen or more years ago I used to take my governmental panaceas to an ex-cabinet officer who handled the firm's legal business. He would listen patiently and then say wearily: "That's all very well—you've got a fine idea, but remember that this is a democracy—that the majority rules—and that you can't put over anything that the majority aren't educated up to." It is the same in industry. The policy of every company is controlled by the men who own the company—by the men who own the majority of the stock. Consequently the ideals of each corporation are no higher and no lower than the ideals of its stockholders. The president and general manager is the visible sign of authority but it is his constituency, the men who elected him—the stockholders—who have the say in the end, just as surely as it is the United States senator's

constituency who eventually decrees whether he shall return to Washington for another term or whether he shall seek the comparative obscurity of a long-neglected law practice. The corporation president and the United States senator both know this and govern themselves accordingly. We must remember the fact whenever we become impatient to reform politics or to reform industry.

Gain as a Motive

Stockholders are just as human as the rest of us. When we buy a share of oil stock we are more interested in knowing how soon it will begin to pay a 100 per cent so we can buy a motor-car than in knowing whether the well-driller owns a Ford or walks. What goes on inside a company does not usually claim the attention of the ordinary stockholder unless there is a public scandal or unless the company ceases to pay dividends. What every manager knows is that he is secure as long as nothing disagreeable gets in the papers and just as long as the dividends which his corporation pays are sure, frequent, and large.

The motive was gain when the first little group of Babylonians gathered together their goods and entrusted them to the leader of a caravan some thousands of years before Christ. It was the same when Spain sent forth a caravel. It is the same today. The risk of losing our capital is not as great now and the leader of the enterprise can no longer flay his lazy workmen alive. But if there were no chance of gain why should you and I and the other men in the street invest our savings? Much as we may instinctively recoil from "base commercialism" we must face the fact that industry was, and is, organized to pay dividends upon invested capital, and that until there is a radical change in human nature this will quite probably continue to be the *raison d'être* of industrial organization.

Public Approval

Such being the case, the wise general manager endeavors so to conduct the business that it will earn the largest possible dividends compatible with the retention of public approval. It is no longer profitable to work men sixteen hours a day. It is inadvisable to employ children. Reasonable sanitation and safe working places earn dividends. Since education has become general and since—thanks to the press—what is done is generally known, it pays to have a good reputation. The "lower selfishness," which tries to elbow its way violently aboard a crowded street-car and acquires a bloody nose in the process, has been replaced by the "higher selfishness," which bows low and says, "After you, my dear Gaston," and is thereupon, for very admiration, invited to ascend first. But an awful lot of public service corporations got bloody noses before they replaced "the public be damned" with "the public be pleased." Only the other day I spent two hours with the president of one of our largest coal companies, who told me how all during the shortage of 1920 he had held the price of his coal down to the point where it paid a reasonable dividend and had taken care of his regular customers at his regular price when he was offered sometimes six and ten times as much by frantic manufacturers. He is now cashing in on the goodwill so created and earning good dividends while the companies which profiteered are flat. He is the wise administrator; he treats his men well and he lives up to his word but he hasn't any illusions that he is running a charitable institution or that he would hold his job very long if he did not produce dividends for his stockholders.

Factors in Industrial Organization and Operation

There has been less effort made in this country to differentiate between the administrator and the executive than there has abroad. Over there the administrator is the man who

shapes policies, while the executive is the man who carries them out. Lloyd George is the typical administrator; Kitchener was the typical executive. The administrator gauges the public, analyzes the situation, and, aided by staff workers, develops a policy of action. The executive, aided by his line executives, forces this action.

In business, lines are not ordinarily so closely drawn but from the following analysis of the activities of those responsible for the formation and operation of a corporation it will be seen that administration is a distinct function even though it is not always relegated to any particular person:

1. The entrepreneur or promotor, who discovers the economic need which justifies the existence of the business. He may be an inventor like Edison, a mechanical genius like Ford, or a trader like Astor—but he must be able to dream dreams and to make others believe in them, and in him. He may not be an organizer but he must have the idea and the courage to force it upon others.

2. The stockholders, who have sufficient belief in the enterprise to be willing to deny themselves the immediate and certain pleasure of dissipating their savings for the less certain future pleasure of securing interest without diminishing their principal.

3. The directors, who are the representatives elected by the stockholders to watch over the security of their capital and to insure that it earns the largest possible dividends.

4. The president of the corporation, who is placed in direct charge of the business by the directors. His duties ordinarily are largely administrative and consist of devising ways and means to attain the objects for which the corporation was created. It may be his duty to secure and weld together the organization—those who are to man the corporation as it becomes a going concern.

5. The general manager, who is appointed by the president

to carry out the policies determined upon.[1] His duties are largely executive and he is the chief "line officer." It is his duty to hold the organization together and to see that it functions smoothly. He is really a psychologist.

6. The staff, consisting of specialists of every variety—lawyers, engineers, personnel directors, chemists, geologists, and all sorts of research men—who furnish the management, consisting usually of the president and the general manager, with facts about the business which enable them to formulate policies and carry on the business successfully. Staff officers also assist the line executives directly. The work carried on in the planning department is principally a staff operation and certain sorts of functional foremen are staff men even though they possess a certain amount of line authority.

7. The line, which comprises all the executives of the company and which is responsible for getting things done—sales managers, factory managers, financial managers, superintendents, and foremen.

8. The rank and file,[2] which consists of all those who actually process material or who do the routine clerical work necessary to sales and production.

Lessons from Russia and Italy

Apparently there is something more to industry than labor —consisting of manual workers—and capital—consisting of buildings, engines, and tools. Every manufacturer has known this for years but it required the Russian and Italian experi-

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[1]Organizations differ with every business. The president and general manager are sometimes the same person. Sometimes the general manager runs the factory and sometimes he manages the sales. We are simply endeavoring to describe a characteristic organization in such a way as to make clear the reason for the existence of the offices and the duties which must be performed by some officer of a corporation.

[2]There is really no clear line of demarcation between the lower order of staff and line officers and what is ordinarily known as "labor," or the working force. It is rather a difference in the proportion of head work to hand work. It is, however, not at all fair to call the manual laborers "the workers," as everyone knows who has actually climbed the ladder from manual laborer to manager that the amount of work done by the former is mere child's play as compared with that undertaken by the latter.

ments to demonstrate the fact to the dreamers and radicals of the world. These experiments were not without a certain value in other respects, as they furnished the despotic employer with an example of what might happen when the rank and file were uneducated as to the value of anything except the tools of industry and manual labor, and when they were badly treated. It is unfortunate, but a bloody nose seems to be the only thing that will teach either the extreme autocrat, or the extreme member of the proletariat, that the higher selfishness is more profitable than the lower. The stability of capital as well as the stability of labor—and incidentally both dividends and wages—depends upon the education of the majority—the stockholders and the rank and file—to a point where violence is not required to teach either group that mutual respect and fair treatment pays best in the end.

Elements of Control

Administrative and executive control may be said to consist of:

1. The statistical analysis of the objects for which the business was created.
2. The establishment of standards of attainment covering such objects.
3. The determination of the laws which actuate humanity —the development of the *science* of managing men.
4. The development of the ability to make men react in accordance with such laws—the acquisition of the *art* of managing men.
5. The discovery and establishment of the most effective organization structure—devising and enforcing the organization chart which best fits the personnel of the organization to the physical structure of the industry.

6. The establishment and perpetuation of the control mechanism:
   (a) Standardization. (See Chapter VIII.)
   (b) Planning and dispatching. (See Chapter IX.)
   (c) Rate-setting and incentives. (See Chapter XI.)
   (d) Personnel direction. (See Chapter XIII.)
7. Reward of all concerned—from stockholder to laborer—in proportion to the degree in which the standards of attainment are realized.

1. Objects of the Business—Ideals

Before we turn to the material aims of the corporation a word should be said in regard to ideals. I do not mean pious prating about invested capital as "a hostage to fortune for the good of humanity" or similar hypocritical outpourings. Perhaps men should be in business for their health but the fact remains that most of us aren't. At the same time neither are we all out to screw the last cent out of the widow and the orphan. The majority of men in business have quite definite and decent ideals—ideals which could honestly be printed in large letters over their office doors without serious damage to themselves or to the business. Much harm is often done to a firm by unscrupulous employees who misunderstand the firm's policy. A crook always suspects everyone else of being crooked. A great many firms are therefore committing their ideals to writing and discussing them with their salesmen and with their factory executives.

Furthermore there is a growing belief among the far-seeing administrators of the larger concerns that the possession of vast capital does entail a responsibility to humanity. Industry is getting so big that serious doubts of the rights of private ownership of public utilities are found in capitalistic as well as in socialistic circles. The spirit of service, I know, is growing among our greater administrators and executives.

The rights of workmen and the rights of the public are receiving a consideration at the hands of business men that they never received when the prosperity of only a small percentage of the population was dependent upon the prosperity of industry. Industrial leadership is coming to mean wide industrial service, and industrial service is rapidly becoming service to all humanity. We must not forget this in giving consideration to the practical ways and means which are discussed in the following paragraphs.

Profits

Normally the amount of profit earned by any business depends upon four fundamentals:

1. The cost to produce.
2. The cost to sell.
3. The sales price obtained.
4. The quantity sold.

In order to control these fundamentals certain facts must be known to the administrator. In order to serve his constituency he must realize certain principles and he must receive detailed information regularly as to just what occurs.

Wherever possible, administrative decision and executive action should be based upon facts rather than upon opinion. Facts of sufficient accuracy to warrant important decisions affecting the policy of a company cannot be collected at a moment's notice. Since the management is likely to be called upon at any time to make decisions upon which perhaps the existence of the business depends, the maximum and continuous prosperity of the business necessitates an easily accessible storehouse of facts upon which the decisions of the management may be based.

Furthermore, an exact knowledge of conditions, and in consequence the timely applications of praise or of construc-

tive criticism, is one of the chief forces of the management in securing results satisfactory to a company's stockholders. Undeserved and spasmodic criticism of department heads in either the sales or operating departments is unjust and destroys initiative. Unmerited praise renders the executive ridiculous in the eyes of his subordinates. Either practice is bad for discipline and weakens the power of management.

Statements and Reports

Statements of profits, of sales, and of production costs are an unjustifiable burden upon the business unless they aid actively in the administration of the business. If such statements reflect conditions which existed at some remote period they have only historical interest and are of little other value.

The time of men at the head of any large corporation is limited. It is therefore necessary to arrange the facts pertaining to the business in such order that the most vital will come to their attention automatically and with sufficient insistence to make it impossible to avoid reaching the necessary conclusions. Such facts should also be presented in the order of their relative importance. If this is not done there is always the danger of attaching undue importance to some isolated and unusual mischance which circumstances have forced upon the attention of the management, as well as the danger of missing entirely some vital fact which has not been reached for lack of time.

In order to judge the effect of a change of policy or to decide upon a new policy it is necessary to have access not only to sufficient detail but to detail arranged in such a way as to reflect the effect of any policy upon all departments affected as well as upon the profits as a whole.

Too many managers give thought only to what comes to them, assuming that matters not mentioned by subordinates must be in satisfactory condition. This assumption is very

dangerous, as the subordinate is more likely to mention something which will please the boss than something which may bring down censure upon his head. The successful departmental head learns very early to cover up his mistakes and parade his successes. That is human nature—taught us as children when we were first punished because our shortcomings were observed by authority. If each subordinate knows that he will be judged upon a basis of results obtained rather than upon the basis of the personal impression he makes upon the boss the time or two he happens to meet him during the month, that knowledge is the best stimulant to a sustained effort to accomplish what is important to the prosperity of the business.

2. Standards of Attainment—Budget Systems

The future can be predicted only by a study of the past. It is impossible to develop a satisfactory budget system, one that will give anything like an accurate estimate of how much you will need to spend in the future, unless you know what sums you have spent for similar things in the past and under what conditions you were called upon for the expenditures.

The practice of budgeting expenditures several months or a year ahead is now too well established to require detailed comment. It is based, of course, upon an advance estimate of the probable market for the product. In some businesses this is comparatively easy; in others it is practically impossible. The attempt is always worth making, however, because, even if the guess is wrong, the future has at least been considered in much greater detail than where a business is run on the hand-to-mouth principle.

To my personal knowledge American industries differing as widely as a watch and clock company of international reputation, a building material company, a coal mining company, and a concern making machinery for the mechanical handling of all sorts of products have been successfully operating under

a budget system since before the war. The treasurer of one of them told me that while 1914 upset their budget entirely, it saved them thousands of dollars by enabling them to foresee the steps which they would have to take to meet the chaos of the first year of the war, long before they would otherwise have given consideration to certain aspects of the matter.

Sales Quota

The estimate of the market for a manufactured product rests upon the establishment of the district sales quota. The difficulty of doing this varies with the type of business. For example, it is comparatively easy to secure the statistics in regard to the number of automobiles of each class in each country from the list of licenses issued. From such a list it is fairly easy to arrive at the annual consumption of tires and gasoline per annum. The share of this business which a particular concern may look for depends upon such factors as its plant capacity, sales ability, and so forth. Some of the market investigators will even determine how much soap or breakfast food of a particular class a certain district should take. Everyone who has classified replies to advertisements and the results of canvassing and demonstrating campaigns knows that such forecasts are not as impossible as they might at first seem. The advertising counselors have been engaged in this work for years and recently the universities and the engineering societies have been taking it up.[3] Where no such information is available it is customary to adopt the output capacity of the factory or of the mine as a sales quota—and to form plans for the disposal of all that can be turned out.

Cost and Profit

Once the standard output is tentatively arrived at it is comparatively easy to estimate from past records, the expendi-

[3]See 1921 Transactions of Taylor Society and of Society of Industrial Engineers.

ture for labor, for material, and for overhead. A sales price is then set and the profit is naturally the difference between the cost to manufacture and sell and the sales price.

At this point the "practical manufacturer"—if he has not given up in disgust chapters ago—will ejaculate "preposterous"

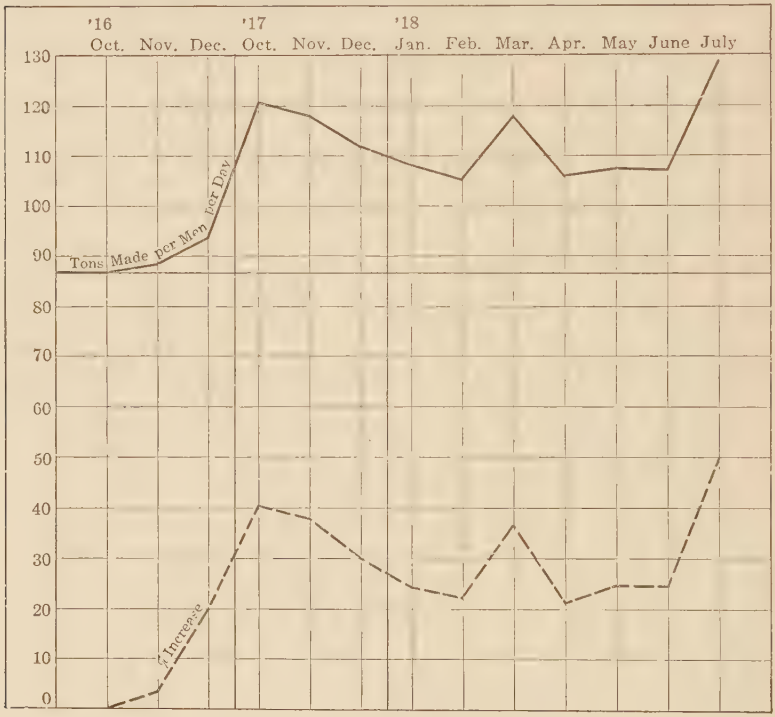

Figure 61. Chart Showing the Result of Scientific Executive Control in One Plant

and hurl the book at the cat. If he thinks that the statement just made means that a man can in this way guess in advance every year exactly how much his profits will be, he is quite right in his disbelief. Even at that, I know the comptroller of a very large company who has bet his associates $100 that his estimate of the concern's profits for 1921 will be within 1 per

cent of a certain figure. However, the value of budgeting is not so much to be derived from always guessing exactly right—if you can be sure of doing that every time I would suggest that you take up stock gambling or horse racing—but from foreseeing months ahead where you are coming out if you don't alter your policy. The man who figures just what the present rise in labor and in materials will do to his profits six months hence, is much more likely to alter the price or to alter the plan of sales campaign in time to please his stockholders, than the man who doesn't know where he is coming out until he is handed a statement of earnings the day before the annual meeting. Perhaps you cannot always show a 1919 profit, but with a budget system which shows you just how much and just where you are falling down, months before the year closes, you are much more likely to administer your business successfully than where you figure such things unsystematically when you happen to think of it or after they have happened.

One public utility company I know has worked out a formula by means of which it can show the public service commission exactly what every change in wages, in material costs, or in rates will do to its earnings. The president of one of our largest coal companies has been predicting his profits so closely for years that you would almost think his charts—showing the actual in contrast with the estimated, were *ex post facto* affairs if you didn't know better. This sort of thing is being done regularly in some of the largest American concerns and the return is well worth the trouble.

Control Charts

The standards set should be indicated on the various control charts. In fact an administrative chart without a line indicating the standard to be attained—the course the business should follow—is almost as valuable to the man steering the business as a nautical chart without a line indicating the course

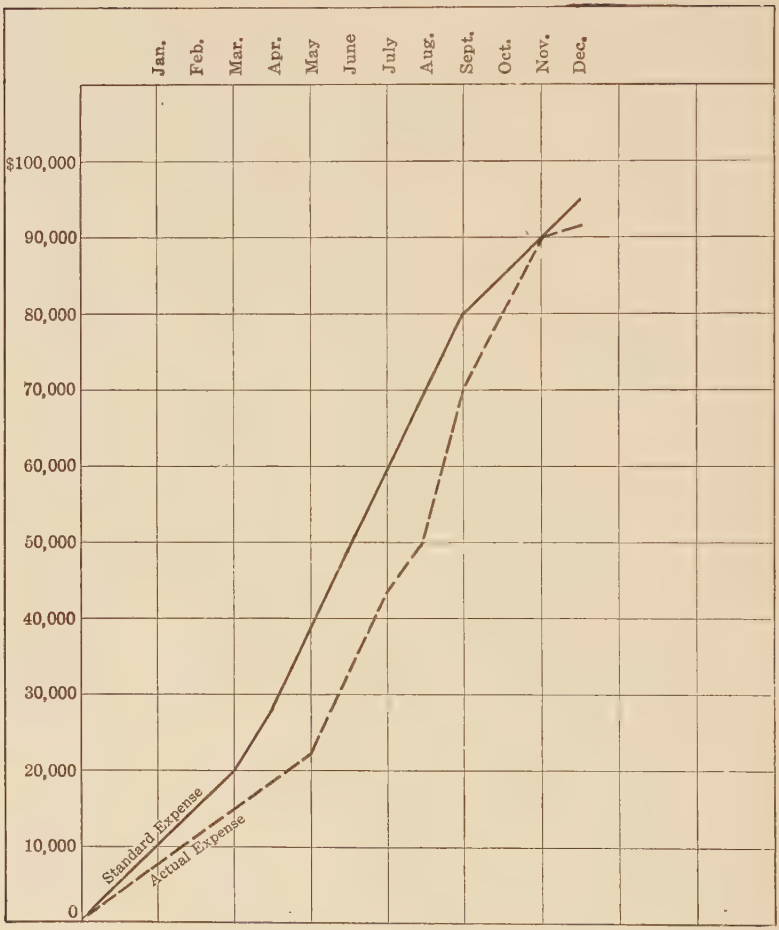

Figure 62. Cumulative Expense Chart

the ship should take, would be to its navigator. The line may not be exactly followed in each case but common sense demands that you plan where and by what route you are going before you start—especially if the safety of others depends upon a safe voyage. It is not our purpose to go into details as to the types of charts best adapted to this purpose. The cumulative

expense chart (see Figure 62) is exceedingly valuable. By means of that and the type shown in the profit chart (see Figure 63) almost any facts can be shown graphically.[4]

3 and 4. The Science and Art of Managing Men

Besides its statistical aspect there are two other aspects of administrative and executive control. One is the philosophical aspect—the conscious or unconscious investigation and

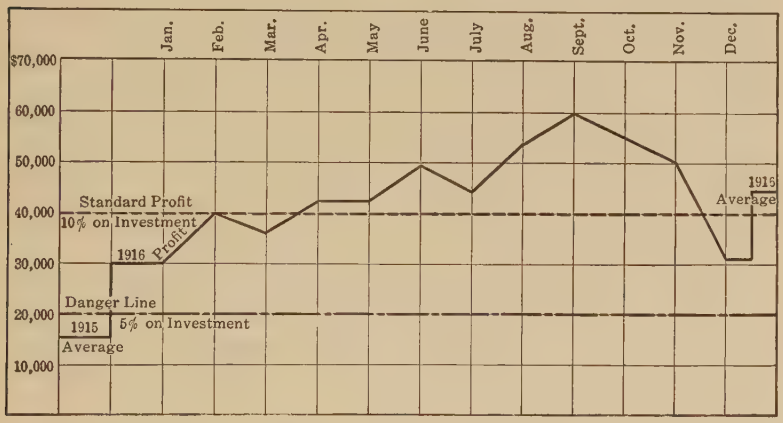

Figure 63. Profit Chart

classification of the motives which actuate our fellow-men, together with the technique of operation of such motives. It is necessary for both the administrator and the executive to know in a general way what will be the effect of certain words and acts upon the public and upon their organization. They must have a knowledge of real human nature, not of ideal and non-existent beings dwelling in the mist of a far-off Utopia, but of common ordinary *real* human beings—the kind that Machiavelli, Bacon, La Rochefoucauld, Lord Chesterfield, and

[4]See also four articles by the writer entitled "Scientific Administration" which appeared in the July, August, September, and October numbers of the *Engineering Magazine* in 1916. Also the eleventh volume of the Industrial Extension Institute's Factory Management Course, entitled "Executive Statistical Control."

Ed Howe describe—practical people who really want to get on.

In addition to a general knowledge of real human nature the administrator and the executive must be able to diagnose each individual case and to treat the subject in such a manner as to secure the reaction desired. Every successful school teacher knows that certain boys must be inspired, before they will really try to do their best work. The diffidence of one must be overcome by kindly reasoning. Another must be shown, in horrid colors, what will happen when examination time arrives. To the lethargic must be forcibly demonstrated the advantages of activity. The same difference of qualities which makes one instructor send forth a class eager to work while another dismisses his boys in a thoroughly numbed condition, makes one man a successful executive, while everybody hates to work for another. Like almost every human endeavor, management consists in part of a science and impact of an art or technique. There is the knowledge of how men should be managed and the ability to put such knowledge to actual use. A man must possess both if he would be a successful executive.[5]

5. Mechanics of Organization

Aside from the philosophical aspect—although perhaps closely related to it—there is the matter of mechanics of organization. This has to do with the type of structure which best fits the personnel of the organization to the physical structure of the business. It necessitates an analysis of the business from the standpoint of departments, processes, and professions or trades.[6] Its visible sign is the organization chart. The preparation of this chart requires a careful study of the business and of the administrative and executive material available. The chart should first be drawn up from the standpoint of

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[5]In this connection we advise careful study of "Developing Executive Ability," by Dr. E. B. Gowin, and "Business Administration," by Edward D. Jones.

[6]See article in *Administration*, May, 1921, by Clinton E. Woods, "The Practical Organization of Industry."

following the flow of the various raw materials through the plant, department by department, with due regard for the various types of work performed at each stage. This very survey often brings to light many possible economies of operation which may be affected by rearrangement and reorganization. The plant should then be so divided that responsibility can be absolutely placed for everything occuring in every department.

Functionalization

It is usually advisable to functionalize in so far as the placing of responsibility will permit. That is, the more closely the rule of placing all of one kind of work under one man is followed, the more skilled each man becomes in his specialty and the more intensive treatment each branch of the work secures. Just as soon, however, as functionalization is carried to the point where there is doubt in the mind of the workman as to just which one of the functional foremen giving him orders is his boss, the advantages of functionalization begin to be offset by lack of discipline. By careful study most of the advantages of functionalization can be secured, under the military departmentalized type of organization, by the application of staff service under the direction or with the approval of the foreman who is responsible for the conduct of the department. For instance, the foreman of a certain department may have his machines set up by men under the master mechanic, who also sets up machines in other departments. The set up may be according to standard instruction cards devised by the engineering and time-study departments, and the tools may be ground at the toolroom and delivered to the machine together with material as directed by the planning department. Nevertheless the foreman may be absolutely responsible for all that happens in his department and rightly expected to secure credit or blame for the results so long as he doesn't protest as regards the service any of the staff enumerated furnishes him.

Relation Between Staff and Line

The relation between staff and line is sometimes very subtle. Some men function sometimes as staff and sometimes as line. Take for instance a repair man under the master mechanic doing a job for a department foreman. The master mechanic has line authority over his repair man, who must do what he is told as regards the method of repairing the machine—although the foreman's advice may be asked. At the same time, with respect to the department foreman, the work is "staff" or, if you prefer the term, "service" work requisitioned by him and really bossed by the specialist who is the master mechanic. Similarly the planning clerks are pure "staff" so far as the factory goes but they are under the direct orders of the production manager and are therefore "line" in so far as he is concerned. The whole planning department may be under the shop superintendent, who is a line officer, or it may be under the general manager. In some of the larger companies the industrial engineer is pure staff and acts as staff officer to the president. This is the case in one of our largest motor company consolidations, where each factory manager has his own industrial engineer but calls on a member of the president's staff for advice and assistance. It is not so necessary to define staff and line exactly in every case as it is to recognize the general distinction—the staff for research and investigation, the line for action—and then to arrange matters so that the responsibility for everything—whether good or bad—can be placed exactly.

"Responsibility for" is much more important than "authority over." Unless this fact is recognized an organization operates with vanity instead of service as its motive power. When the personal vanity of the executive is the driving force, jealousy replaces co-operation and mutual assistance, corporation politics consumes the energy of the personnel which should be devoted to making the business successful, and the result is low

morale and stagnation. It is unthinkable that a man should be empowered to give orders without assuming the responsibility for the effect of such orders. This axiom must be understood and subscribed to by every executive from straw boss to president, if an effective organization is to be secured.

Corporate Authority

Another fruitful source of difficulty is the confusion of corporate authority with line and staff authority. Corporate authority is such authority as is vested in certain offices created when a company is incorporated and is usually defined in the charter, the articles of incorporation, or the by-laws. The president of a company, as a corporation officer, presides at directors' meetings, the vice-president presides at such meetings in his absence, the secretary keeps the minutes of the meeting, and the treasurer technically is in charge of all moneys and securities of the company. These officers may in addition function as line or staff officers, but unless it is plainly understood that their titles as corporate officers give them no authority whatsoever in the staff and line organization there is likely to be constant friction. When a certain great public work was completed one of the men responsible was made general manager of a large corporation. The owner of that corporation had some half-dozen beautiful daughters, each of whom had acquired a husband of social distinction. Each husband had been provided for in the business by the donation of a vice-presidency. They were all long on authority and short on experience and sense of responsibility. As a result they made it so impossible for the general manager that he resigned after 6 months' of interference and the company lost a much needed competent executive. It is always much less expensive to pay the incompetent sons and sons-in-law a salary to keep away from the business than it is to make them vice-presidents and then fail to make it clear to them that corporate authority,

as such, begins and ends at meetings of the directors and stockholders of the corporation.

Very often, however, corporate officers function also as line executives. In order to avoid confusion it should be understood, however, that any executive authority exercised is subject to the control of the president as chief executive of the company and is under the direction of such executives as are associated with him in what is usually known as "the management" which constitutes the continuous, active, executive head of the corporation.

The Executive Organization

The line organization—which it will be remembered is the executive organization, the men who are responsible for action, for carrying out the policies decided upon by the administrative officers, for the attainment of the standards set—is so arranged that under all circumstances there is an officer in command whose orders are to be obeyed at once and without question.

This makes it imperative that each member of the organization, regardless of his title, have definite superiors and definite inferiors in order that he may know from whom to accept orders and to whom he may give orders. Once such lines of responsibility are established each executive knows the departments for whose efficiency he will be called to account.

Any other type of executive organization means conflicting orders, industrial politics, recrimination and blame-shifting, and all the inefficiency which goes with ill-defined lines of authority and responsibility. Furthermore, action can be secured much more quickly when it is necessary to go to only one superior for orders than when several must be seen in order to insure against censure. Discipline is maintained since the workmen know from whom orders are to be respected and find out that they cannot go over their superior's head merely for the pleasure

of telling their boss "where he can get off" when he reproaches them for not carrying out his own orders.

It requires self-restraint among superior officers who have been in the habit of giving orders direct to the workmen wheresoever they pleased, not to give such orders—especially when directions are asked for by the men. The only way discipline can be maintained is for each line executive—except of course in the case of accident—to refuse to give any orders whatsoever except to the executives immediately under him. He is at perfect liberty to question, to discuss, and to take note, but the order for action must come through the regular channel. In this way only can initiative be developed and real assistance be secured from those under you. You must respect each boss's authority if you expect his men to respect it. The only way this can be accomplished is to refuse to give orders either directly or by implication except through the channels indicated on the organization chart. Such a chart is shown by Figure 64 and several of the principal divisions are explained herewith.

Explanation of the Typical Organization Chart

The Management. In the case of the large corporation the president, who as administrator and chief executive has accepted the responsibility for the successful conduct of the business, must necessarily secure assistance. To that end he hires certain executives to be associated with him in his work. These men, who together with the president are in active charge of the company's affairs and who are empowered to render all decisions as to policy and action not specifically reserved for the board of directors, comprise what is known as the "management." The decision of the management is final and in important matters is usually rendered after conference. In the case of the absence of a member of the management, those present should inform him fully upon his return

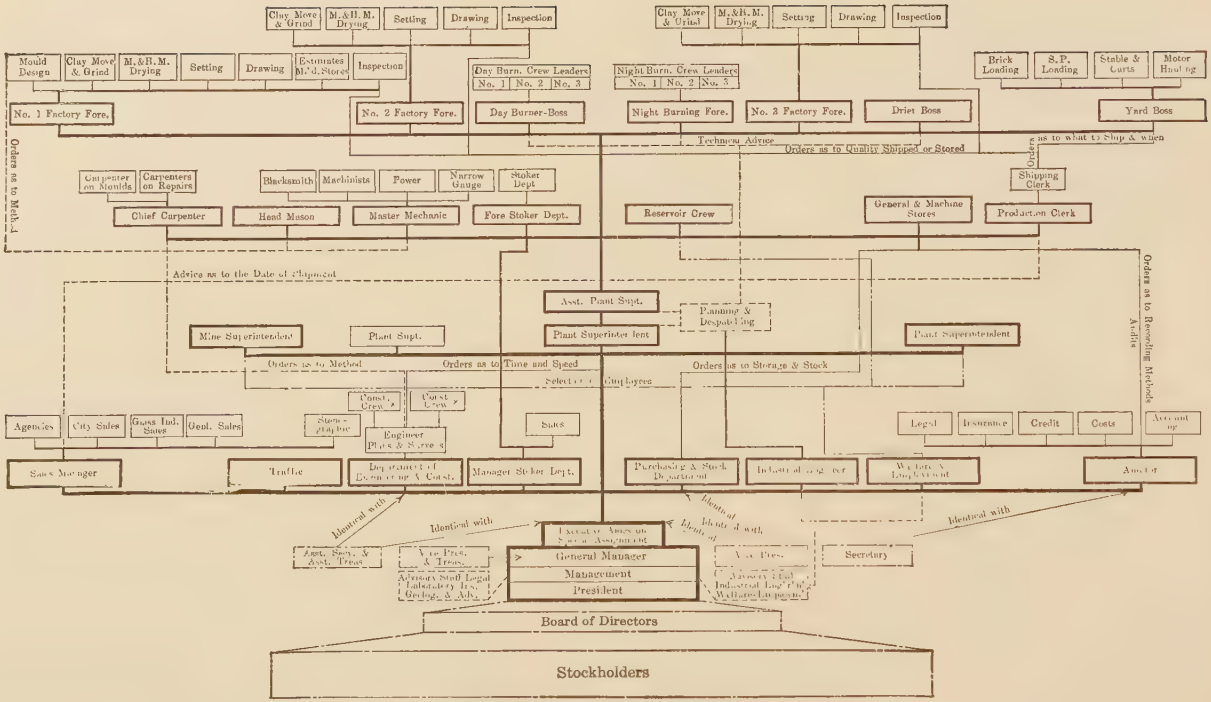

Figure 64. Typical Organization Chart

Solid lines indicate flow of "line" or absolute authority, dash lines (– –) "staff" or advisory power, broken lines (— – —) corporate authority, double broken lines (—— –· ——) authority over welfare and employment. All dash and broken lines require line authority for executive action. *When necessary.

in order that subsequent decisions may be rendered in the light of full knowledge.

The General Manager. The general manager is appointed by the president and is directly in charge of the details of the company's business. He is responsible only to the president and directs the sales, engineering, purchasing, employment, auditing, and manufacturing departments. It is his duty to secure competent heads for these departments and to see that the work is conducted in such a manner that the profits of the business will at all times be maintained at the maximum.

Executive Aides. In any large concern there are always various matters requiring intensive study and attention. At such times the management should be empowered to secure assistance and to delegate executive powers to those most competent to handle the situation. For instance, the settlement of certain legal claims may be delegated to a lawyer, a geologist may be empowered to direct certain mining operations, or a corporate officer may be induced to take charge of a serious traffic situation or a material shortage. Such executive powers should, however, in order to avoid conflict of authority, be delegated *only in writing and for a specific period.* In all cases copies of such orders should be sent all line executives affected.

Advisory or Staff Authority. In order that the line organization may have at its disposal the knowledge of those specialists whom increasingly complicated industrial problems have made necessary, the management of the large modern corporation adds to its organization temporarily or permanently certain staff officers. It is the function of such specialists to advise as regards a certain field, leaving the management to act as it sees fit. The lawyer advises regarding a legal situation, the laboratory furnishes data in regard to a mix, and the geologist brings in a report in regard to a new ore field. Similarly the industrial engineer and the personnel director

make certain written recommendations. Such of these as meet with the approval of the management are signed and thereby converted into executive orders, which are transmitted to the departments affected through the usual channels. This staff is purely advisory as regards the line officers and is responsible only to the management. It is organized for detailed study and recommendation rather than for action and is designed to furnish continuous and detailed assistance to the line. The exact relation of line to staff in this particular case is shown by the chart.

Fitting the Chart to the Personnel

In working out an organization chart quite as serious consideration must always be given to the personnel of the available officers as to the ideal organization structure. The first thing to do is to draw up the ideal organization chart showing the positions to be filled. The second thing is to determine what human material you have or can get to fill these positions. The result is always a compromise. When it comes to scrapping a valuable employee or a pretty plan the wise man always scraps the pretty plan. One of the oldest installations of scientific management in America threw out certain phases of functional foremanship because it did not utilize to the utmost the talents of one of their most valuable men. The very young man insists on fitting the organization exactly to the chart. The veteran in industry knows the value of every tried employee and alters the chart enough to utilize his services to the utmost. The rule is: Draw up the ideal chart. Analyze your organization. Fit them together with the least loss to each, but always give the man the benefit of the doubt.

6 and 7. Control Mechanism and Rewards

Technical control is usually a matter of technical instruments placed at the disposal of workmen whose reward is in

proportion to their attainment of fixed standards. Figure 65 shows an example of such control. The pyrometer at the left indicates the temperature of any one of twenty furnaces when the furnace operator throws the switch to the furnace number. Such readings taken at regular intervals are entered by the furnace operators on the long sheet shown on the slide in the foreground. The times at which the pyrometric cones melt,

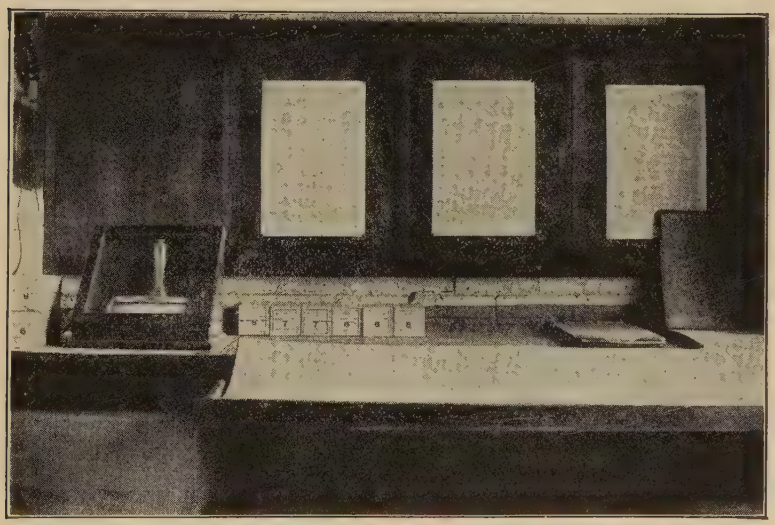

Figure 65. Combination of Technical Control with Statistical Control
Bonuses are based upon quality of product and upon coal, output, and labor saved.

certain draft and gas readings, and notes in regard to general conditions are also entered on this long sheet by the actual furnace operators. Instructions for 24 hours issued by the planning department and approved by the technical chief each afternoon at a planning meeting, are entered in the open book shown at the right. The closed book shows the detailed results of each heat, together with certain special information required to link cause with effect in sufficient detail to allow mistakes once made to be avoided in the future, and gains in

quality, fuel, and furnace turnover to be analyzed and made permanent. The graphs on the wall show the current attainment of standards of labor, quality of product, and fuel economy so that the furnace operators know just where they stand as regards efficiency bonus.

Graphic control of manufacturing operations has been described in connection with the chapter on planning. The

Figure 66. Mechanism of Planning

The work tickets in the pockets indicate just what is being done and the next job planned for each man. The "Excess" division shows each foreman at 9 A. M. how many men in excess of normal are at work in his department. The control charts at the right indicate the passage of various jobs through the different departments.

mechanism employed in planning is further illustrated in Figures 66 and 67a and b.

The Planning Organization

The planning organization depends upon the nature of the business. There is no doubt that at one time there was a tendency toward overcentralization. Later a certain reaction set in. The main feature of the change is the removal of as

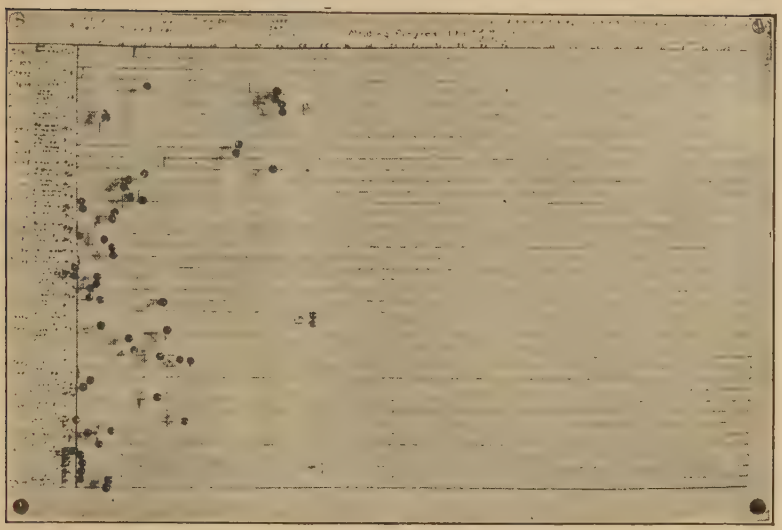

Figure 67. (a) Control Chart

Close-up showing progress of individual jobs through the various departments. The color of the pin denotes through which department the jobs are passing. The location of the pin shows the number of tons which have passed and which are still to pass through the department.

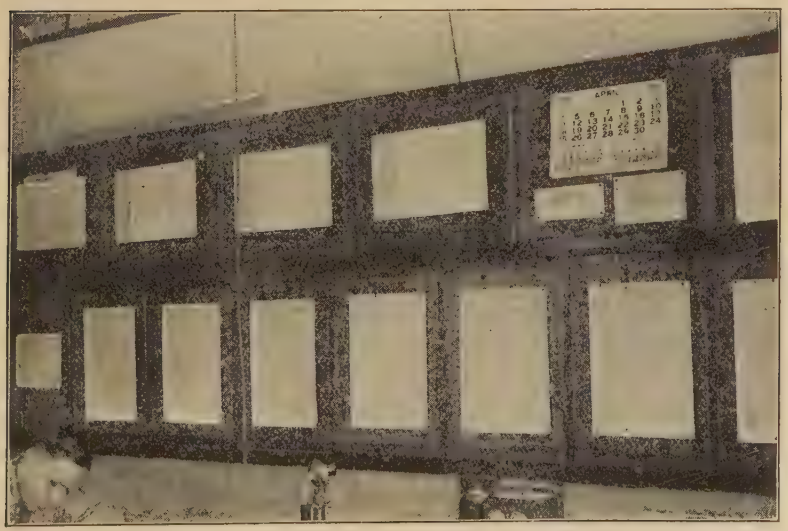

Figure 67. (b) Control Charts

These graphs are fastened to drawing boards which may be removed from the racks to facilitate the work of keeping them up to date.

much of the planning work as possible from the central planning and control office to departmental substations in charge of the departmental foremen, the central station retaining only general authority as to methods and issuing such general orders as are necessary to insure a steady flow of the incomplete parts from department to department. The responsibility for the conduct of each substation is placed directly upon the foreman of the department and the clerks therein are his employees. The result of this is the development of the foreman, whose interest and sympathy are naturally enlisted more strongly for the plans which emerge from his own department, than where cast-iron plans are imposed upon him from some central control office filled with young clerks for whose knowledge of shop conditions and human nature he has no respect. The result is to utilize to the utmost that experience and loyalty which those who know intimately the sterling qualities of that much maligned but mostly honest individual—the foreman of American industry—have long felt deserved recognition.

While such a movement is good psychology there is always the danger—especially in the case of reaction—of going too far. An excerpt from a recent letter on this subject received from Colonel George D. Babcock illustrates what I mean.

> Where, due to a variety of processes, foremen have charge of a comparatively limited number of men, and especially where the variety of parts and number of mechanical operations are great, and when these parts must go through other departments and eventually enter single complex assemblies, any tendency toward decentralized control of the order of work for the parts, or of the fixtures and equipment or machinery necessitated in their preparation, will increase "work in process" inventories and cause a material unbalance of production as compared to the direct instruction as to procedures from the central controlling or co-ordinating division.
>
> Due to the variety mentioned, affecting the opportunity for the foremen to specialize in processes on particular machines, or the possibility of securing a large number of foremen who

have all of the mechanical qualifications necessary for the conduct of the work, and as well the highly technical knowledge involved in intensive planning and despatching, decentralized planning will not make for the homogeneous relations of the organization or of product.

When in an industry, different units of the product are produced in sufficient quantities so that each unit of product may be set aside under decentralized control, and the various functions and processes can be economically applied, or where the product itself is manufactured on a strictly progressive basis, the parts having the same routing through the same machines continuously, it is obvious that central control is limited to merely the co-ordination of operations of the various departments particularly applied to the entrance and exit of its material.

Centralized control or decentralized control is not a matter of choice, but rather a matter controlled by the factors in in the business, none of which has a greater effect than the quantity of each finished unit which is to be produced for sale.

A Successful Method

A method that is strongly recommended is to put the responsibility for the conduct of the department absolutely up to the foreman, and then have all the planning possible done in a departmental planning office by a clerk who is under the orders of the foreman as regards everything except planning methods. These methods are controlled by written instructions prepared by the industrial engineer on the staff of the general manager, and signed by the general manager after being OK'd by the foreman and the plant superintendent. All planning which cannot be done to advantage by the departmental planning offices is done in the central planning department. Each morning the force of the production manager or of the chief dispatcher in the central planning office works out the general plan for the next day in detail. This is what is known as the "best" plan. He also at times prepares certain alternate plans "nearly as good." At 1 o'clock each depart-

ment foreman surveys the situation in his departmental planning office. At 2 o'clock he comes into the central planning department for the "general planning meeting" where he looks over and OK's his section of the general plan and discusses mutual problems with the other foremen and the plant superintendent. The superintendent then OK's the whole plan and the foremen return to their departments before 3 o'clock with complete orders for the next day. This permits the gang bosses to make out their labor schedules[7] requisitioning any extra labor, etc., by 4 o'clock so that the work tickets for the individual workmen may be completed and placed in the dispatch boards (see Figure 66) before the dispatch clerks go home that evening.

This plan is extremely flexible inasmuch as it allows as much or as little centralization as is necessary but at the same time gives the foreman his day in court in such a way as to enlist his co-operation. Furthermore it stimulates his interest in planning by permitting him absolute authority over *such departmental details as can be safely left to him without upsetting the general plan which controls the flow of material from department to department.* At the same time it prevents changes in the system by irresponsible parties and piles up the full force of the general manager's orders behind the system. The foreman is freed from clerical detail but is furnished with the detail he should have in order to conduct his department effectively. Under this system the amount of planning done in the central office and in the departmental offices will, of course, vary with every business. Personally I firmly believe that the principle of delegating as much authority as possible to the man in personal touch with what is happening from hour to hour in the shop is the right one. Just how much authority is the right amount must be worked out carefully and dispassionately for each type of industry.

[7]See standard practice instructions, Chapter XIII.

CHAPTER XV

ADMINISTRATIVE AND EXECUTIVE CONTROL IN EUROPE

Objects of Continental Businesses

In Chapter III the organization structures (5)[1] in use in Europe were discussed briefly. The control mechanisms (6) in use were discussed in subsequent chapters on planning, etc. On the Continent I found very little doubt in the minds of business administrators as to the objects for which business was created (1). The first object was the earning of dividends. The second object was to put one over on the ancient business rival in another country. Especially were the allied countries out gunning for Germany who before the war stunted their own industrial growth by dumping quantities of German-made goods upon their home market at prices with which they were unable to compete. Patriotism has become almost as great a motive for business activity abroad as the desire for profits.

France

The science[2] of managing men (3) is given considerable attention in France—not so much as a part of business training as in the light of an interesting topic of conversation. We have already referred to the disclosures of a certain French employment manager in regard to his rules for managing women (Chapter XV). I couldn't find any industrial literature on the subject but much has been written by the psycholo-

[1]For an explanation of the numerals used in this chapter, see page 354 *et seq.*

[2]The science of management is the science of psychology—as taught by Ladd, James, etc.; the art of management is the science in action—as practiced by such men as Schwab.

gists and by the philosophers from the days of ancient Greece to the present day.

The art of managing men (3) is highly developed in France —perhaps more than in any other country. The proof of that lies in the almost utter absence of labor troubles since the war while every other country, including America, has been torn with strife. It also lies in the French reputation for politeness and tact. The French were the first to discover liberty, equality, and fraternity and they were the first to find that the higher selfishness—courteous treatment of one's fellowmen—pays better than the lower selfishness, which emulates a crowd of pigs all trying to monopolize the bucket at once.

Germany and Italy

In Germany the system has been to figure out methodically what sort of men make the best cogs in the various wheels of industry and then educate the children to be that sort of men. Italy's system is in process of development, that development has been sharply stimulated by the object lesson of last August, which proved pretty conclusively to even the most reactionary that the previous methods needed revision. Courtesy to the subordinate must be learned in Italy before real cooperation in industry can be secured.

England

England—in so far as I was able to learn in the time at my disposal—has gone much further in the statistical analysis of the objects for which the business was created (1), in the establishment of standards of attainment covering such objects (2), in the development of organization charts (5), and in the reward of all concerned in proportion to the attainment of such standards (7), than the continental countries, with the exception of Germany. Even in England, however, such work has been confined principally to a few bright lights like the Hans

Renold Company, Moreland and Impey, Cadburys, Metropolitan Vickers, certain Armstrong and Whitworth plants, the Spirella Company, etc. With the majority of firms administrative and executive control, as described, is purely an art inherited with the controlling interest or acquired in the battle for survival much as it is in America. One such director informed me that they "drew up an organization chart once, but that there were so many damn lines on it by the time we figured out just how many people were giving orders to each foreman, that we tore the damn thing up."

An exceedingly interesting method of co-ordinating material and financial direction by means of cumulative charts (see Figures 62 and 63, pages 362, 363) and of predicting profits in a manner similar to that described in the previous chapter, has been worked out by F. M. Lawson and is described in the second chapter of his book.[3]

An English Firm's Organization Chart

The managing director of one of the most progressive concerns in England presented me with his personal copy of the firm's organization chart. It is in the form of a well-bound 9½ x 13½ loose-leaf binder containing ten sheets of heavy linen paper 13 x 16 upon which the organization chart is printed. The organization is of the departmentalized military type with staff in control of certain functions and in principle closely follows the chart shown by Figure 64 (page 370). The arrangement is as follows:

Main Organization Chart. This chart (see Figure 68) shows at the top the "board of directors," containing names of governing director (chairman of the board) and of the company secretary. From this a line leads down to the "managing director." The labels in each case contain the name of the man in charge of the department and the account number.

[3]Lawson, F. M., Industrial Control, Sir Isaac Pitmann and Sons, Ltd.

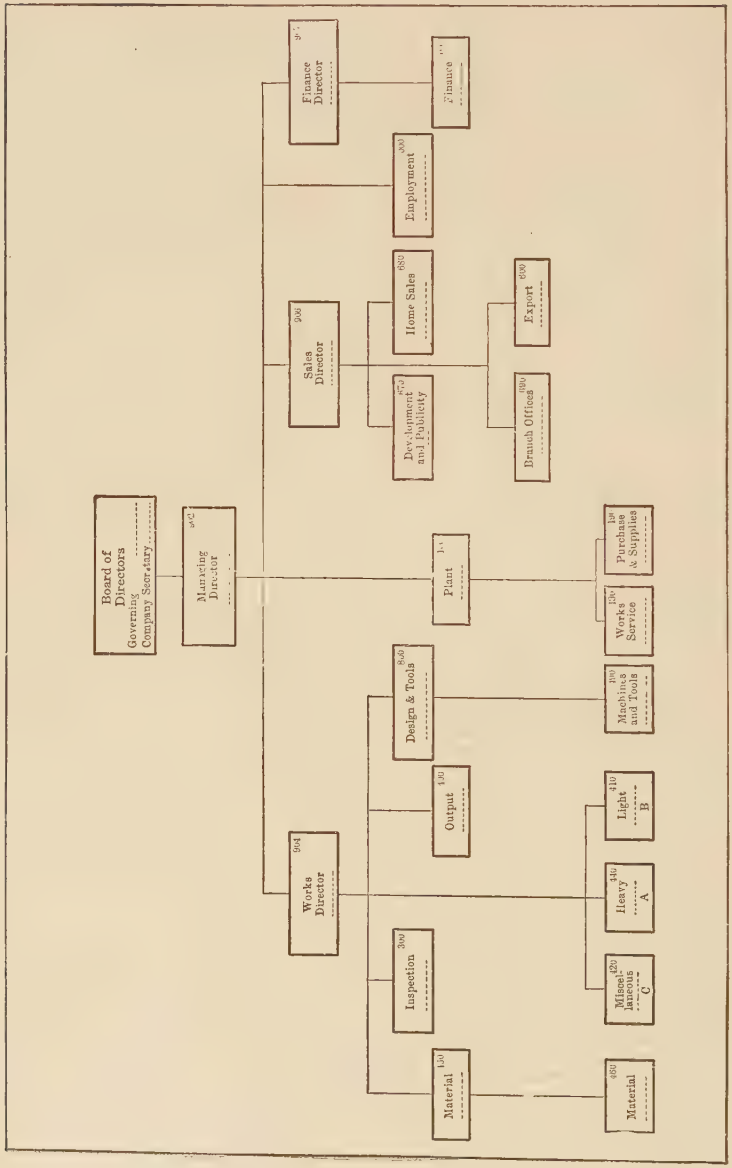

Figure 68. Main Organization Chart of a Progressive English Firm
Figures refer to account numbers.

Under the managing director are the works director, the sales director, and the finance director. Incidentally the plant (works service, and purchase and supplies) and the employment departments report direct to the managing director.

Under the works director are two material departments—the head of one reporting to the head of the other, who is the assistant works manager—an inspection department in charge of the works manager—departments A (heavy), B (light), and C (miscellaneous), each under a senior superintendent—an output department and a design and tool department (to which the machine and tool department is subsidiary).

Under the sales director there are departments of development and publicity, home sales, export and branch offices, each with a separate head.

Under the finance director is the finance department.

Divisional Organization Chart—Works Director. This chart gives the detail of the departments under the works director, and is shown in Figure 69.

Divisional Organization Chart—Selling. This chart gives the detail of the departments under the sales director, whose name appears in the top label opposite a label containing the names of the men comprising the sales council.

The first main branch is marked "development and publicity department" and is presided over by a manager and a deputy. Beneath are the departments for non-standard applications, designs and patents, and publicity, each under a chief.

The second branch contains the home sales, stocks, and delivery department under a manager and a deputy. Below appear the sales engineers, clerical, merchandise stocks, packing, motor transport, and some special product sales departments.

The third branch contains the branch offices departmental, with a chief in charge of a number of branches in various principal cities of Great Britain.

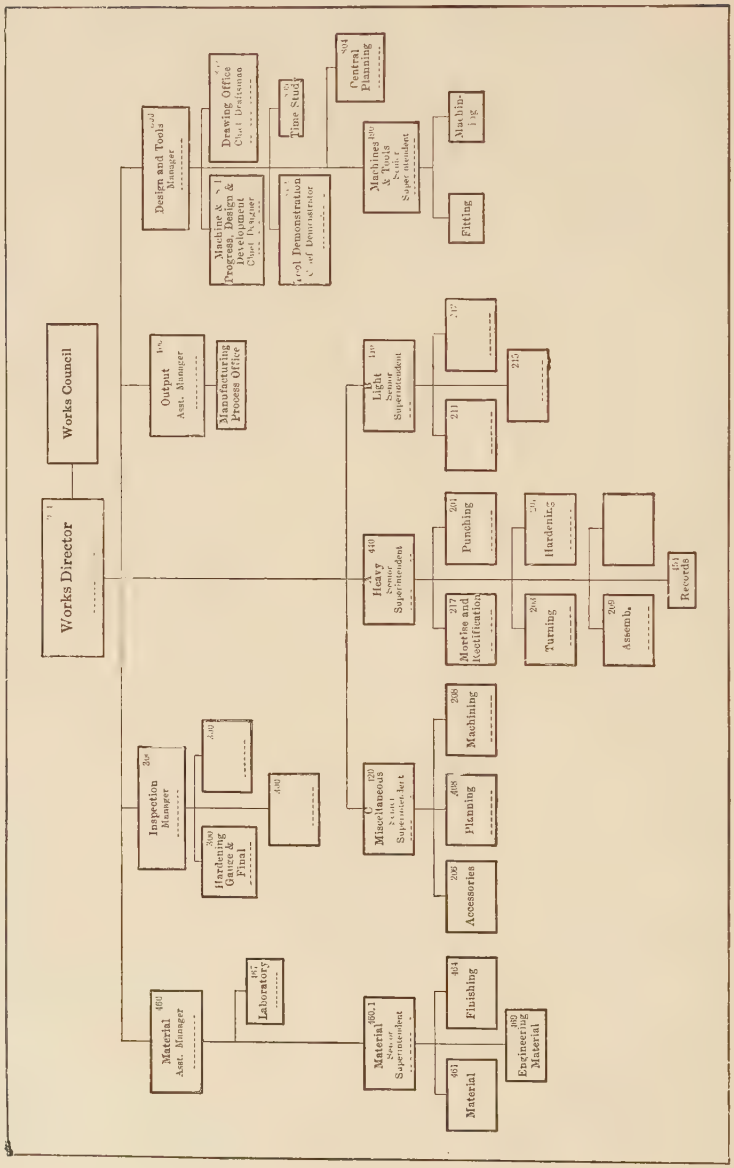

Figure 69. Divisional Organization Chart—Works Director
Figures refer to account numbers.

The fourth branch—marked "export"—is under an assistant manager and a deputy.

Divisional Organization Chart—Finance. Under the finance director is an assistant manager in charge of finance. He is assisted by the cost accountant, who is directly in charge of the:

1. Accounts—company accounts and taxes, sales ledgers, vouchers.
2. Tabulator.
3. Costs and wages, costs and prices, departmental accounts, and pay-roll and service
4. Cash and records—pay-roll records, petty cash, and telephones.

Divisional Organization Charts—Plant. This chart gives the detail of the work directly under the managing director. The plant is under an assistant manager, who is in charge of the following branches:

1. Purchase and supplies under the purchasing agent, who has charge also of the order editing, supply record, general stores and scrap-handling departments, and the central receiving station.
2. Plant development and design department.
3. Works service under a senior superintendent, whose duties cover supervision of:
   (a) The garage.
   (b) The plant running, maintenance, and shops.
   (c) Electrical.
   (d) Pattern-making.
   (e) Domestic services.
   (f) Lodge.
   (g) Furnace and general, bricksetters, laborers, joiners, and plumbers.
   (h) Order of work, finance, stores.

Divisional Organization Chart. Under the managing director, who is directly in charge, are:

1. The employment manager, who is responsible for canteen, clerical, first-aid, sick suspension, education, and continuation schools.

2. The assistant manager for women employment who is in charge of the women in the departments enumerated under the previous heading (canteen, etc.)

3. The social secretary and stationery departments.

Sectional Organization Chart—Design and Tools. The organization of the tool and design department is shown in Figure 70.

Charts have been drawn up also for the three plant departments under the works director, each of which manufactures a different class of product. The most interesting feature of these charts is the relation between the functional lines and the direct authority lines. The direct authority lines show the subdepartments into which each of the five or six principal departments is divided. The functional line, which is the same on each chart, parallels these lines and is connected with each of them by means of dotted lines at the point where the functional or staff assistance flows into the main line, in much the same manner as is shown on Figure 64. In the English charts the staff assistance departments are marked "Inspection," "Manufacturing Output," and "Finance."

Comparison of the above description with the organization chart (Figure 64, page 370) will show the main points of difference between the British and the American practices. These are principally differences of nomenclature. The extensive and careful sales organization should be especially noted as well as the inspection, the planning, and the research organization.

The method of drawing up and binding the chart is worthy of notice as it makes consultation and filing easy and

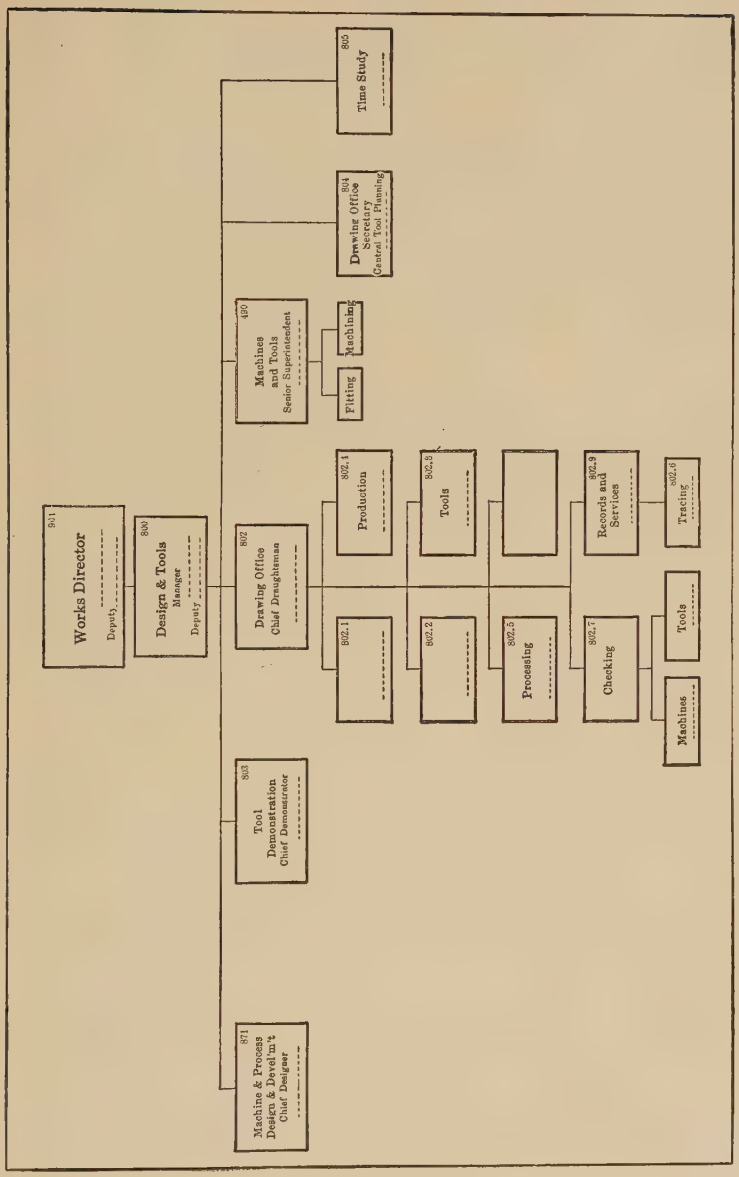

Figure 70. Sectional Organization Chart—Design and Tools
Figures refer to account numbers.

permits each department to post[4] its own chart without posting the whole set of charts.

Delivery Dates

In another British plant I found charts showing the percentage of delivery dates promised that were exactly kept each

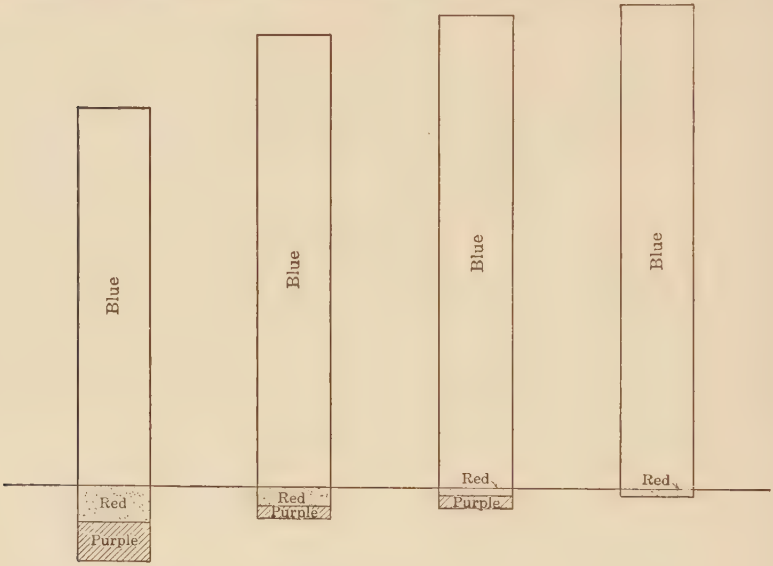

Figure 71. Charts Showing Percentage of Delivery Dates Kept
"Blue" indicates number of orders filled as promised.
"Red" indicates promise broken once in month.
"Purple" indicates promise broken twice in month.

month. In no case were promises broken by more than a day or two, but standards were set showing the most desirable percentage of attainment for each class of goods. It had been determined that 95 per cent of some classes of goods should be shipped exactly on time, while 90 per cent was sufficiently high (when orders were heavy) on others. For instance, a man whose factory is shut down because he is waiting for an engine

[4]It is customary to post charts on the walls of each department.

repair part is ordinarily much more upset if it arrives a day late than a man who has ordered a part of a machine tool or a monkey wrench. These charts are arranged as shown in Figure 71.

The same firm carried charts showing the standard promised time in days and the actual delivered time each month on each sort of order. Furthermore a printed loose leaf was sent all salesmen each week, showing the delivery time they were safe in promising on each variety of goods and the amount of stock of each already on hand.

Sales Quotas and Departmental Charts

Furthermore the country had been divided up very carefully into small districts, sometimes two or three in a large city, and the boundaries marked on the British ordnance maps, which are extremely accurate and complete. Sales quotas were then set for each district, based upon how much of the sort of product manufactured by the company was consumed annually by each firm in the district. From this and from the factory's capacity, output and profit standards were set.

This company had a home sales manager, a foreign sales manager, and a planning sales manager, who, together with the director of sales, made up the sales committee. Plans were under way for the routing of salesmen, much as it is done in certain plants in this country, where a schedule showing the time of arrival at each town—the customers to be visited at each, etc.—is worked out before the salesman starts out on his trip.

A cost chart is kept which shows graphically each month the fluctuation in the cost of producing each article. Furthermore departmental charts are kept showing the monthly efficiency of each department, the per cent of men on efficiency bonus, and the per cent who should have been on bonus. (See Figure 72.)

Classification of Executives and Clerks

An interesting organizational feature of this plant was the division of the clerical and executive force into three classes. Staff A[5] consists of those earning £400 a year and up and having been with the company six months, and of some

Figure 72. British Departmental Chart

"Blue" represents the per cent of the total number of men in the department who were on bonus, "Green" the per cent of the men engaged in non-productive work, "Red" the per cent of the men who were not on bonus but who should have been.

others who because of responsibility of position held and for certain other reasons are declared eligible by the directors. Staff A employees have a three weeks' vacation, the right of

[5]In England the word "staff" is used to designate clerical or non-manual employees.

election to the suggestions committee, and each morning register their time of arrival at the plant in a book. Staff B must earn 30 shillings a week, have two weeks' holiday, and must punch the time-clock upon arrival. Staff C are juniors earning less than 30 shillings a week and have only 10 days' vacation.

At another plant the office staff were not only classified into A and B but wore special uniforms of black and gray striped material. The foremen wore blue uniforms, the deputy foremen white uniforms with blue ties, and the charge hands white uniforms with pink ties.

Decentralization

The plan found in one plant of furnishing the sales, purchasing, and factory managers departments, each with a laboratory, has been referred to in a previous chapter. This same plant placed all shipping under the sales department, which is responsible for all damage due to improper packing. The sales department buys from the factory at a fixed price and so shows a profit based upon the prices secured.

Each superintendent has his own inspectors as well as his own planning department. The effect of this, I was told, is to enlist his co-operation to the utmost—inasmuch as he regards the inspectors as "his men" rather than as spies upon his work or clerks from an alien department. The managing director of this plant told me they were "just recovering from a bad attack of overcentralization," and that while they were retaining their central planning department to plan and dispatch work from department to department and to supervise all planning in a general way, they had transferred to the departmental planning offices every bit of planning and dispatching which could be so decentralized without loss of planning efficiency. This method is carried still further. Each departmental foreman has also his own inspectors, who are more inclined to assist him to devise ways and means for the avoidance of defects—

so my guide told me—than if they were under a separate department. The work of these inspectors is checked in the final inspection where the inspectors are under the works director. There is no question as to the soundness of the psychology of decentralization. The danger, as in the case of all reactions, is that the decentralization will be carried to a point where the individualism and inertia of the various foremen will so weaken the central planning that the shop will revert to the inefficiency of the foreman-controlled shop of the past.

Sales Policies

At another plant I found that the statistical department had divided the country into sales territories by postal districts. This is, after all, a most logical division, as postal districts are based upon transportation conditions and the shipment of goods and the travel of salesmen are governed by the same conditions. Sales, defined as "shipment from stock," are always credited to the man to whom the territory is assigned, by weight as well as by values. Statistics are compiled as to prices obtained in each territory. Salesmen are paid commission in proportion to the profitableness of each product sold and in proportion to the difficulty to sell. A chart is brought up to date each week showing the sales, the amount manufactured, and the stock of each variety of product. Costs covering each variety are prepared monthly.

Graphic Control

The private office of the managing director of one large plant was lined with blackboards upon which each week were charted the actual departmental production vs. departmental production standards, and figures showing the sales by districts. Charts of this type were also kept up weekly. (See Figure 73.)

A budget system was in effect by which the monthly expenditure of each department and the monthly profit which

each should make was figured out six months in advance and departmental heads were each month given a statement showing how nearly they had attained standard.[6]

In the engineering trades administrative control of this sort is rare. Nevertheless in going through such plants there are very often evidences of an awakening. In a large steel

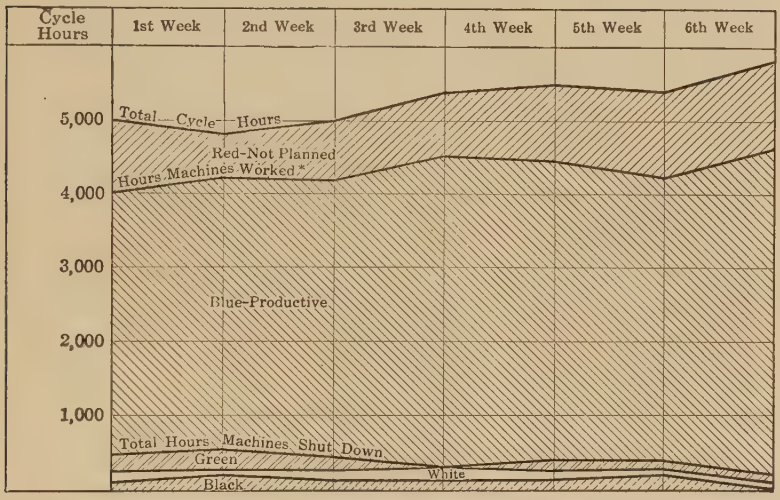

Figure 73. Weekly Production Chart

"Cycle Hours" represent the total possible machine hours if all machines were operated at standard speed. Causes of shutdowns during planned time are shown as follows: "Green" represents breakdowns, "White" no power, "Black" transmission. *On actual production basis.

plant I found charts posted up in the various departments showing the monthly output and the cumulative average production by weeks. In another plant I found a similar chart and was told that the foremen were becoming interested in it.

Increasing Importance of Organization and Administration

Business is becoming too complicated and incorporated units have become too vast to make it possible for the super-

[6]Semiprocessed work is valued on a machine-time basis.

man to control longer an industry by the force of his personality and of a physique which enables him to work 18 hours a day. The captain of industry today must devote his time to organization and administration, depending upon a carefully organized staff to supply him with facts and a well-organized and well-trained executive force to act in accordance with the conclusions as to policy into which he transmutes such facts. Someone once said that the one quality which above everything else made Lincoln the leader of his country's destiny was his ability to secure the facts, to digest them thoroughly, to think the complicated problems through to a correct conclusion, and then to express this conclusion in a few simple words which even the humblest could understand. Lincoln was the true type of administrator—for the industrial administrator of vast enterprises must no less stand before his public and before his constituency. He is responsible for the well-being of thousands —stockholders, executives, workmen, professional men, shopkeepers, and their families—and his success or failure will depend upon his ability to envision ideals, to secure facts, to arrive at correct conclusions, and to convert his conclusions into acts. He has need of every method of control ever devised and the greater he is, the more quickly he is realizing this—whether he live in America, England, France, Italy, or Germany.

CHAPTER XVI

SELECTION AND EDUCATION OF EMPLOYEES

Neglect of the Human Factor

The most important factor of industry—the human factor—has only just begun to receive the attention it deserves. The war forced upon the attention of even the most obtuse the necessity for conserving man-power and for making every muscular unit produce the utmost result. The problem was attacked from the mechanical side by the introduction of devices which enabled the weak to do what only the strong had previously been able to accomplish. It was attacked from the standpoint of incentives to work, and from the standpoint of health and sanitation, in order to enable each unit to function as effectively as possible. Units were selected with greater care with respect to their fitness to perform each sort of work. Last but not least, serious attention was given to the education and training of the man for the job.

Previous to the mechanical revolution, man performed the work for which centuries of evolution had fitted him. Manual and dorsal labor at low speed kept the physique he had inherited from the land apes in proper working order. With the introduction of machinery a hundred years ago man undertook a type of labor for which evolution had not fitted him. The result was at first appalling. Fourteen or sixteen hours of slow exertion in the open air, with periods of rest and conversation, continued through a few months in the year—the life of the farmer of a century ago—is not particularly injurious to the human frame. Fourteen hours' work a day in a factory, begun when the workman was seven or eight years old, continued the year round under unsanitary conditions, pro-

duced in the second and third generation human monstrosities.

There is a reason for the difference in physique and mentality of employer and employee in England. The experimental stage—the period during which the people were finding out what the industrial revolution had done to them—produced such tragic figures as those which composed the Midgets Battallion, that army of dwarfs which—until retired for very pity—fought for England during the Great War. The men who went out from the industrial districts in 1914—from Liverpool, Manchester, and Glasgow—were mere walking wrecks compared with the men you see on the streets there now. Five years of exercise in the open air, with good food and repaired teeth, have made a difference in the appearance of the British man in the street, which even the most casual traveler cannot fail to notice. Corrective measures began, it is true, half a century ago with the factory acts limiting hours and laying down conditions of employment. But the war took the matter of health out of the class of philanthropy and made it a necessity for national survival. In England, as in every other country, the lesson learned during the war is now being applied to enable the country to hold its own in economic warfare. The efficiency of the labor unit is being maintained and increased for the sake of keeping production costs low enough to enable the country to compete in the world trade market.

Phases of Conservation and Development

The conservation and development of the human factor in industry seems to have broken out in every department almost simultaneously. Beginning in America about 1917 with the Rochester convention of employment managers and the short courses in employment management given under the auspices of the federal government, with the army tests of Walter Dill Scott and his associates, and with the vestibule training

schools, where Iowa farmers were made into machinists in a few weeks, a multitude of activities, which had previously existed only in isolated plants, were applied to industry generally. The relation of each to the other can perhaps be best shown by a tabulation:

1. Job analysis—the determination of the qualities each variety of work demands from the workman.
2. Workman analysis:
   (a) Trade tests—consisting of questions and tasks which determine whether or not a workman is *experienced* in a trade.
   (b) Psycho-technical tests—consisting of questions and tasks designed to determine the workman's physical and mental *fitness* to perform certain work, when properly trained.
   (c) Miscellaneous tests—ranging all the way from the first impressions of the interviewer through observational analyses, phrenology, handwriting assays, and aura divination, to soothsaying and fortune-telling.
3. Training the worker:
   (a) Shop work for apprentices.
   (b) Vestibule training schools—for new employees not fully trained for the job.
   (c) Shop laboratories—for determining scientifically the one best way to do each job under existing conditions and for training existing employees to perform the work according to the method determined.
4. Educating the worker:
   (a) Education of the child.
   (b) Schools for apprentices.
   (c) Trade schools.

(d) Continuation schools—for the "young person" who works part time.
(e) Night schools—for mature workmen who wish to improve their positions.
(f) Education in citizenship—which includes instruction in hygiene, sanitation, safety, and in all branches of knowledge the possession of which increases the workman's value to the community as a citizen.
(g) Educational courses for foremen.
(h) Education in management.

Selection of Materials and Men

It is obvious that it is impossible to select goods to fill an order until the order is presented. It is also obvious that a man who would make out an order without knowing how many and what sort of goods were needed could be characterized only as a blithering idiot. Under the circumstances it is remarkable that the same principles which have been applied to the selection of materials for over half a century are just beginning to be applied to the selection of labor. In the selection of material the steps were:

1. The preparation of specifications, covering dimensions and quality in great detail.
2. The determination of the quantity required.
3. Placing an order designed to secure the exact quantity, size, and quality required.
4. Inspection and test to determine whether quantity, size, and quality coincide with the needs of the purchaser as specified in the order.

Of course, this neglect of the human factor has been due to that weakness of human nature which makes us avoid the difficult task for the easy one. It is easy to write specifications

for materials as compared with specifications for men. It is easy to compare materials with the specifications, but hard to determine whether or not men meet specifications even supposing them agreed upon. Because the task was hard the boss has preferred to intimate that he possessed a mysterious power —a sort of black magic—which enabled him to judge men. He has rather fancied himself in the rôle of divinely inspired oracle, and in consequence selection until recently has been on a basis of "hunch," of likes and dislikes, or upon some quality upon an intellectual par with that which leads the monkeys in the park to select certain offerings and to reject others.

The problem of improving the quality of materials received the attention of our best brains. Consider the history of the development of iron and steel for the past century. On the other hand it took the Great War and the threat of world-wide Bolshevism really to wake us up to the necessity for improving the quality of the minds and bodies of our workmen.

Job Analysis

The first step in the selection of labor is the preparation of the specification—of the job analysis chart. Figure 74 shows an excerpt from a typical job analysis chart used in an American concern. It is not scientific in the laboratory sense, but anyone who has ever made a similar survey of an industry knows that it is about 1,000 per cent in advance of the vague and nebulous unrecorded standards which exist in the minds of various foremen and hiring clerks in the industries of the country. Some day we will have scientific standards. Meantime the job analysis shown will at least insure that someone has given careful detailed consideration to the type of man required for each job and it will insure rates of pay somewhat in proportion to the difficulty of the job and to the time required to become proficient at it.

The proof that such a job analysis is a logical development

1	2	3	4	5	6	7	8	9	10	11			12
Account	Operation	*	7/2/—	10/7/—	Bonus Earn.	Daily Wage	Class	Men	Women	Dep't. 1	2	3	Description
L-D-1-A	Unloading Clay from R.R. Cars	10	$.30	$.35	60%	$5.60	2	√	2	√	√	√	Unloading Clay from R.R. Cars, Wheeling
—G	Wheeling Clay to Pans	10	.30	.35		3.50	1	√	3	√	√	√	Wheeling Clay from Bins to Pans
L-D-2-A	Pan Tender	10	.36	.41	18%	4.84	5	√	3			√	Supervises Grinding—Charge of Pan Men
A	Pan Men	10	.32	.37	18%	4.37	4	√	2	√	√	√	Tending Dry Pan—Charge of Wheelers
C	Screen Man	10	.30	.35	18%	4.13	2	√	1	√	√	√	Care and Cleaning of Screens
B	Crusher Man	10	.30	.35			1	√	1	√	√	√	Crushes Grog for Dry Pans
L-D-3-A	Wet Pan Tempering	10	.33-8	.43		3.80	5	√	3		√		Tempering Clay—Wet Pans
B	Pug Mill Tempering	10	.30	.35	°10%	3.85	3	√	2	√		√	" " —Pug Mill
D	Special Mixer	10	.40	.45			5	√	3	√			Charge of Mixing HM Clays—Mud Wheeling
L-D-4-A	Hand Moulders	9	.38	.43	58%	6.80	6	√	3	√			Throwing of Clay into Mould
C	Retort Moulders	9	.46	.51	44%	7.35	9	√	4	√			Supervision of Retort Moulding and Drying
C	" Rammers	9	.30	.35	44%	5.04	5	√	5	√			Ramming Clay into Retort Moulds
B	Mud Wheelers	10	.30	.35			1	√	2	√			Wheeling Mud to Hand Moulders
P	Dry Press Tender	10	.35	.40	18%	4.72	3	√	2	√		√	Adjusts Press and Offbears Brick
Q	" " Offbearers	10	.34	.39	18%	4.60	2	√	1	√		√	Takes Brick from Press
S	Wet Press Tender	10	.37	.42	°10%	4.62	5	√	2			√	Charge of Mud Machine; Care of Poid
T	" " Feeder	10	.35	.40	°10%	4.40	2	√	1			√	Feeding Brick into Represses
T	" " Separators	10	.31	.36	°10%	3.96	1	√	1			√	Separates Brick for Feeders
U	" " Offbearers	10	.35	.40	°10%	4.40	2	√	1			√	Taking Brick from Machines
V	Truckers Wet Press	10	.34	.39	°10%	4.29	2	√	4			√	Trucking Brick to Dryers
R	" Dry "	10	.34	.39	18%	4.60	2	√	4	√		√	" " " "
L-D-5-B	Drier Boss	10	.36	.41	18%	4.84	5	√	3	√		√	Charge of Dryers, Fans, Men
B	Drier Men	10	.31-2	.37	18%	4.36	2	√	3	√		√	Pulling Brick Trucks from Dryers
L-D-7-A	Head Burner	12	.37	.42	10%	5.60	9	√	5	√	√	√	Charge of One Burning Shift
B	" Firemen	12	.33	.38	10%	5.02	6	√	5	√	√	√	Charge of Burning Shift—1 Factory
B	Firemen—Second	12	.32	.37	10%	4.88	4	√	4	√	√	√	Experienced Firemen
B	" —Third	12	.30	.35	10%	4.62	3	√	4	√	√	√	Less " "
B	" —Ordinary	12	.30	.35	10%	4.62	2	√	2	√	√	√	" " "

*Usual hours worked.

°These men on stand. Effi. Bonus but men work only part time on them at present on account of reduced output.

Women:—
1—Sure
2—Probable
3—Possible
4—Very Doubtful
5—Impossible

Class (Gen. Ability):—
1—Minimum
10—Maximum

13 Machine or Tool	14 Inside	15 Outside	16 Time to Learn	17 Time for Full Speed	18 Speed 1-5	19 Nature	20 Schooling	21 Tools Required	22 English		23 Nationality	24 Preferred Age	25 Preferred Height	26 Preferred Weight	27 Fatigue	28 Position of Body		
									S	U						St.	Sit.	W
Wheelbarrow		√	1 Day	1 Wk.	3	D					Any	20-40	5′-6″	150	Heavy	√		√
"	√	√	1 "	2 Days	1	Du					"	20-40	5′-4″	140	Medium	√		√
Floor Machine	√		1 Yr.	2 Yrs.	2	DG	R & W		√	√	Any	25-50	5′-4″	145	Medium	√		√
" "	√		4 Mos.	6 Mos.	1	Du	R & W		√	√	"	23 50	"	145	"	√		
" "	√		3 Days	1 Wk.	1	"					"	16-60	"	130	Light	√		√
" "	√		1 Wk.	2 Wks.	1	"					"	16-50	"	130	Medium	√		
Floor Machine	√		6 Mos.	8 Mos.	2	DG	R & W		√	√	Any	25-50	5′-4″	130	Medium	√		
Bench—Floor	√		3 "	4 "	2	D				√	"	25-50	"	140	"	√		
" "	√		8 "	1 Yr.	2	D	R & W		√	√	"	25-50	"	140	"	√		
Bench	√		6 Mos.	1 Yr.	4	Mu	R & W	Trowel	√	√	Any	20 40	5′-6″	150	Medium	√		
Floor Machine	√		8 "	2 "	3	"	R & W	"	√	√	"	25 50	"	140	"	√		√
" "	√		7 "	1 "	4	"					"	20-35	"	150	Very Hvy	√		
Wheelbarrow	√		3 Days	1 Wk.	1	"				√	"	18-50	"	135	Medium	√		√
Bench	√		1 Mo.	3 Mos.	4	C	R & W		√	√	"	20-50	"	140	"	√		
"	√		2 Wks.	1 Mo.	4	CM					"	20-45	"	145	Heavy	√		
Bench—Floor	√		3 Mos.	9 Mos.	2	G	R & W		√	√	"	25 50	"	145	Medium	√		√
Bench	√		2 Wks.	1 "	4	G					"	20-50	5′-4″	145	Heavy		√	
"	√		1 Day	1 Wk.	3	G					"	16-60	"	125	Light		√	
"	√		2 Wks.	1 Mo.	4	G					"	20-45	5′-6″	150	Heavy	√		
Trucks	√		1 Wk.	2 Wks.	2	DH					"	20-45	5′-5″	150	"			√
"	√		1 "	2 "	2	"					"	20-45	"	150	"			√
Trucks	√	√	4 Mos.	1 Yr.	1	DH	R, W & F		√	√	Amer.	25-50	5′-6″	140	Medium	√	√	√
	√	√	2 Wks.	1 Mo.	2	"			√	√	Any	25-50	"	150	Heavy	√		√
		√	3 Yrs.	5 Yrs.	1	D	R, W, F & T		√	√	Amer.	25-50	5′-4″	140	Light	√	√	√
		√	1 "	3 "	1	D	R, W, F & T		√	√	Any	25-50	"	140	"	√	√	√
Shovel		√	6 Mos.	1 "	1	D			√	√	"	21-45	"	150	Heavy			√
"		√	3 "	6 Mos.	1	D					"	20-45	"	150	"			√
"		√	1 "	3 "	1	D					"	20-45	"	150	"			√

Speed:—
1—Slowest
5—Fastest

Schooling:—
R—Read
W—Write
F—Figure
T—Technical

English:—
S—Speak
U—Understand

Nature:—
D—Dirty G—Greasy
Du—Dusty H—Hot

M—Monotonous
C—Clean
Mu—Muddy

Position of Body:—
St—Standing
Sit—Sitting W—Walking

Figure 74. Excerpt from a Typical Job Analysis Chart

lies in the fact that in a number of cases where the fixing of relative rates of pay has been undertaken by committees of workmen, just such matters have, after weeks of discussion, eventually been given consideration as are listed in the headings shown. The class-rating number (column 8, figure 1) is not set until such matters as the time to learn (column 16), the degree of fatigue (column 27), etc., have been determined. Wages are supposed to vary directly with the class rating which indicates the desirability of the job. In this particular instance women were used, before the war ended, up to the third class shown in column 8. The relative desirability of inside and outside work (columns 14 and 15) varies with the season. A man in charge of a crew would usually be expected to speak English, while the men under him might be required to understand it only (column 22). The other column headings are made clear by the footnotes. How far the man making such a survey should go in order to insure that the ratings exactly describe the job depends upon the circumstances. Theoretically it should be accurate to a degree possible only after years of experiment in psychological laboratories. Actually the data which an intelligent man with an analytical mind and the power of accurate observation will collect, are sufficient. If these data are checked by the various foremen involved, and approved by the plant superintendent, they will prove of so great value in fixing wages and in selecting workmen that most plants cannot afford to be without them. The scientific job analysis is on the way.[1] Meantime there is no reason why we shouldn't do what we can with the means at our command.

Workman Analysis—Trade Tests

Having decided what sort of men you would like to have, the next step is to find out what you can get. This brings us

[1]See Henry C. Link's exceedingly able book "Employment Psychology," The Macmillan Company, New York City.

to the second step shown by the tabulation—to workman analysis. The American army trade tests were the great and indisputable proof of the value of such tests.[2] With thousands of men, whose claims and desires ranged all the way from that of the darky who preferred the artillery because it gave him a chance to associate with a mule, to that of the patriotic business man who desired a job as lorry-driver because it would get him to the front quicker, it became necessary to establish some method by which a man of average intelligence could tell a blacksmith from an electrician. This was accomplished by giving a man an actual piece of work to perform, designed to demonstrate his skill, and by oral and picture test. At the time of the signing of the armistice 70 per cent of all soldiers who claimed trade ability could be tested. The results of the tests of those who claimed to be mechanics showed that 6 per cent were experts, 24 per cent were journeymen, 40 per cent were apprentices, and 30 per cent were unadulterated liars.

Such tests show the work in which a man is experienced. They are no indication of the work for which he is physically or mentally fitted. Neither do they indicate his potential ability.

Psycho-Technical Tests

The really big question in industry is, however, "Of what are you capable?" not "What have you done?" The manufacturer is buying futures, not pasts. A man who has spent his twenty years on a farm may become a much better machine operator on a new type of machine than a man who has spent forty years before a lathe, but neither a trade test nor a letter from his previous employer will show it. In view of this fact, and of the cost both to employer and to employee of teaching men work for which they are not fitted, certain

[2]See Industrial Education Circular No. 4. Bureau of Education, Department of Education, Washington, D. C.

men throughout the world have been endeavoring to eliminate this waste from industry by devising some sort of test which will show beforehand for what sort of work a man is fitted. These tests are described in great detail in Dr. Link's book. For instance, a girl who was to be trained for assembly work would be given a test "for the perception of odd shapes and sizes"—a sort of jig-saw puzzle test. The strength of her hands would be tested with a hand-dynamometer, etc. Girls who were to do inspecting would be tested for keenness of eyesight; for speed and accuracy by means of a card-sorting test, a key-tapping test, etc.; for steadiness and for intelligence by means of some of the Woodworth-Wells tests, in which certain numbers are crossed out of groups of figures, etc. As might be expected, common sense tests of this sort where the activities were akin to the activities engaged in when actually on the job, resulted in more than half the girls selected by test proving acceptable workers when trained. The establishment of suitable tests and the proof of each test by recording the ultimate performance of each operator tested, is a stupendous one, as will readily be realized when the complex nature of modern industry is considered. The work is being carried on in America, in England, and in Germany, and it is only a question of time when proved tests will be available which will greatly reduce the proportion of round pegs in square holes and the consequent industrial waste.

Miscellaneous Tests

The miscellaneous tests represent the substitute methods—the methods which we have had to use until the scientific tests were developed. They represent also the panaceas offered by those who have realized the great need of such tests and who have not hesitated to rush in with a doubtful remedy. Some of these people have meant well and others are on a par with the charlatans who offer love-philtres and charms

against bad luck and disease—merely disreputable quacks willing to exploit human weakness for personal gain.[3]

Certain experiments tried upon such charlatans—ranging from sending a plaster cast of a Hubbard squash to "have its character read" to arranging for certain skilled mechanics to be assayed for mechanical skill by the facial structure and texture method, with disconcerting results for the expert—have convinced all except that great class of whom, P. T. Barnum asserted, one is born every minute, that you can't tell what is inside a bundle by glancing at the outside of it. The dreamer who has permitted his imagination and his desire for a panacea for a great industrial waste to get the better of his common sense needs the tonic of such statements as the following, from Dr. Link's "Employment Psychology";

> In the case of large organizations where the process of estimating individuals involves very important stakes, the observational method is extremely dangerous and inadequate.
>
> How comparatively easy it is to govern one's appearance and to act the part for which one is aspiring.
>
> What a great change in the shape of a man's head and the height of his forehead is made by a hair-cut.
>
> A man who to the observer looks like a ferocious round-headed simian one day may become a mild-featured, sedentary long-headed bookkeeper the next—after a hair-cut and a shave.

I have personally known of great injustices and irreparable wrongs committed under the name of such pseudo-sciences. If you would avoid similar experiences keep away from the quacks and patronize the regular practitioners—the accredited psychologists educated in some of our great universities.[4]

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[3]See "Mythology and Science of Character Analysis," by Professor John Foster Adams of the University of Michigan in *Scribner's Magazine* for May, 1921, and "Psychology Goldbricks" in the June number of the same magazine.

[4]See G. M. Whipple, Manual of Mental and Physical Tests; Sherrington's, Integrative Action of Nervous System; and H. L. Hollingworth, Vocational Psychology.

Training and Education

The need for the education of the human industrial unit—whether it be preparatory, as in the case of the child who will eventually enter the factory, or concurrent, as in the case of the unskilled workman or the foreman who can be made to function more effectively by training, or broadly constructive, as in the case of the stockholder or the public, who in the end controls the policy of industry—should be evident without discussion. The more intelligent each part the more intelligent is the whole, and the greatest wastes of industry—the wastes due to the ignorance of men, of management, and of stockholders—can be eliminated only by education. The way to make a man industrious, thrifty, and dutiful is to educate him to industry, thrift, and responsibility when he is a child. The way to make a skilled workman is to teach him the proper way to do his work while he is learning his trade. The way to prevent a workman from spoiling material is to teach him to be more skilful and then make it worth his while to turn out only good work. The way to prevent a workman from accepting the doctrines from someone with an axe to grind—be it Bolshevist, corrupt politician, or demagogue of any sort—is to acquaint him with the economic and moral truths which have been discovered by the honest men of all ages. The way to give the workman the true idea of the ideals which actuate a company and of the methods by which these ideals may be attained is to educate the foremen—who represent the company to the workman—as to what these ideals and methods are. And finally—since the responsibility for the efficiency and for the survival of industry rests wholly upon the shoulders of the management—from the working leader of a crew of two to the administrator who shapes the course which enables the ship to weather the storm of years—the way to insure wise management is to pour the wisdom of the ages—from that of the Greek philosophers down to

the discoveries of today—into the consciousness of those who guide the ship of business. The future of industry rests upon education—education in regard to principles, methods, composition, and technique. A knowledge of things and of men is also necessary, but most important of all is the education of the common people to those high ideals which are the foundation of moral character and of the happiness that endures.

Selection and Education Abroad

While the psychologists, the philosophers, and the scientific men of both France and Italy have added greatly to the knowledge of man, of his reaction to various stimuli, and of the laws and principles which motivate him, in so far as I was able to learn there has been no systematic industrial application of such analyses either in the form of job analyses or of workman analyses.

In England considerable work has already been done along this line. Dr. Link's book is widely read, and in three of the more progressive plants tests were in use or were being devised. At one plant match-board tests[5] were in use. At another, boys applying for work were placed in a special instruction division for a week. Here they were tested out in various ways and at the end of the week placed in the works department for which they were best fitted, or were rejected.

England—National Institute of Psychology and Physiology

Considerable very fine experimental work is being done at the Cambridge Psychological Laboratory. I spent two days there with Dr. C. S. Myers and Professor Bernard Muscio who are working out various mental and physical

[5]Match-board tests are devised to test quickness, dexterity, and ability to follow instructions, the subject being required to move matches about in a sort of cribbage board in various manners.

tests, which should prove of great value to industry. Dr. Myers is one of the organizers of the National Institute of Psychology and Physiology Applied to Commerce and Industry,[6] which was organized for:

1. The establishment of well-equipped laboratories for research into various occupations to determine—
   (a) Conditions necessary to give optimum output, such as elimination of unnecessary movements, best distribution of periods of rest, reduction of monotony, increased interest, etc.
   (b) Causes of mental and muscular fatigue and methods of reducing the same.
   (c) Tests to establish standards by which workers can be selected for the occupations for which they are best fitted mentally and physically, and parents and after-care committees can be advised as to the best vocation for children. This would eliminate much waste at the outset and prevent a great amount of discontent which arises when the worker finds too late that he has taken up an unsuitable occupation.
   (d) Collection and classification of facts established by research. These will be published from time to time in such a way as to indicate their practical value.
2. The co-ordination and support of similar investigations, which may be in progress.
3. The provision of training courses and lectures for investigators, managers, foremen, and welfare workers in the practical application of psychology and physiology.
4. Undertaking investigations at factories, offices, etc., in relation to any special problem.
5. The study of the conditions which tend to the health, comfort, and welfare generally of the worker.

[6]George H. Miles, D.Sc., Secretary, 329 High Holborn, London, W. C. 2.

6. The study of the psychological relations between management and labor with special reference to securing harmony and co-operation.
7. Propaganda work among employers and employed, and active co-operation with the organizations of both, to assist in furthering national unity and prosperity.
8. Establishment of a library and the publication of results to members.

Germany—The Charlottenburg Psycho-Technical Tests

Germany is really the home of the psycho-technical test which implies the highest type of both job analysis and workman analysis. Nearly every plant I visited had in its educational department a section where such tests were given. The sort of tests differed at each plant but all followed the general idea worked out by Dr. Moede, director of the Department for Industrial Psychotechnics at the Testing Laboratory for Machine Tools of the Engineering University at Charlottenburg. To quote from a description of this laboratory:

> The methods employed for determining the physical fitness of individuals are essentially:
>
> 1. Statistics of the operation of a plant.
> 2. The system of query sheets.
> 3. The picking method.
> 4. The systematic examination.
>
> As practiced at Charlottenburg the test is devised to afford parents and tutors a means for advising the youth with regard to the best profession they should take up. Such an advice presupposes positive knowledge of the essential requirements of a vocation or profession and moreover all the applicants must be tested under the same, or at least under similar circumstances and with the same means.
>
> An example of the method employed for measuring simultaneously the accuracy of aim of the eye and the hand is to take a metal plate containing rectangular holes of various width and diameter, and zig-zag lines. This metal plate

constitutes one pole of a battery. The pin which the individual to be examined carries in his hand is the opposite pole of the battery. If this contact pin touches the wall of the metal plate in any place a bell is sounded. The first holes are very large; from 6 millimeters diameter they become gradually smaller until the hole or the slot is only 1-10th of a millimeter larger than the pin. This is a test which a molder for instance, must be able to pass satisfactorily; if his hand trembles he is not in a position to withdraw the pattern from the sand without tearing the mold. Children with hereditary diseases or with nervous debility suffer from such nervous trembling.

Other methods of testing consist in picking out certain pieces of machinery according to drawings, or the solution of technical combination problems. The apprentice is shown a drawing which is not very simple, representing, for instance, an automatically acting float valve. It is explained to him that the water enters from below and he is asked what will happen; or else he will be asked on the basis of another drawing what will happen with a water wheel if one current of water flows upon the vanes from above and another one from below. He is to state what determines the direction of rotation. Repeatedly very good replies were received stating that the direction of rotation and the speed depend upon the relation between the forces engaging above and below.

Serious mistakes which produce a lack of attention and grasping powers are often experienced when it is a question of picking out objects according to drawings shown to the apprentice. If, for instance, the apprentice is shown the drawing of a spanner, he will first of all find a belt shifter, because this instrument is also long and thickened in parts. The result of the psycho-technical examination of the apprentices is inserted upon a protocol. The testimonial, however, will also show data, the lack of which has hitherto often been called a drawback of the system, namely, the environment and domestic circumstances of the boy and also the impression which the examiner has gained during the work in the laboratory and by asking the boy questions.

The methods of examination for adults, as a rule, simply adopt the conditions prevailing in practice, transplanted into

the laboratory in a way to come as near reality as possible, since naturally one cannot test any persons under the actual conditions prevailing in practice.

This refers in the first place to the testing of motor-car drivers. The basis of these tests is the so-called "reflection table" designed by Dr. Moede, in which the lights in the street are represented by white incandescent lamps and the dangers by red or yellow lamps of various sizes. The capability of the individual for grasping the situation is measured by means of a clock registering one thousandth of a second. This table has been employed in various work shops; it has been changed about and improved but in principle it has remained.

The Dresden laboratory for testing locomotive drivers also employs Moede's tables as a signaling picture, in a manner very similar to the original table suggested by the inventor. The table is simply supplemented by gauge glasses, pressure gauge, and signaling whistle. The testing equipment of the Great Berlin Tramway System is likewise based on this same reflection table which has been adapted to the conditions of tram service by Mr. Tramm under the management of the late Baurat Otto. The experimental station of the tramway in Lichtenberg near Berlin is equipped in such a perfect manner that everybody having an opportunity should inspect this station. It is certain that by the careful selection and training afforded by this station the Berlin public is protected against numerous dangers to which it would be exposed by a less carefully selected operating staff. The method adopted in this station is to imitate the actual conditions prevailing as closely as possible. The person to be examined is standing upon the driver's platform and the examiner is standing in front of him. The man operates the controller and brake with all accessories in the same manner as on the tram-car.

For producing a danger to frighten the man, suddenly a mighty short circuit flashes in front of him—if necessary the platform upon which he stands may be lowered 2 to 2½ inches. This is supposed to indicate the car jumping the rails. As the examiner has told us, it often happens that older people simply run away when the short circuit occurs. On the street such a tram-car would continue to run without

the driver being in charge, and an accident would be almost unavoidable. The men are gradually trained to face the danger, the device of frightening them by the short circuit being repeated at frequent intervals.

An additional device which has done excellent service in the testing of men is the so-called "tremometer." This instrument will in time enable the driver to handle the crank of the controller subconsciously, so that he knows instinctively where the contact points are: for instance, for starting the car he must instinctively stop his crank on contact 3, and then go further back for braking. In order to learn this the man must learn to guide a contact pin in a slot without trembling and without touching the sides of the slot. Each touch of the sides is a mistake, which is inserted on the log sheet. According to the information supplied to us by Mr. Tramm of the Great Berlin Tramway System, over a thousand car drivers have been tested in this fashion, and no man is put in charge of a car unless he has passed this examination.

The degree of nervousness of the man and his susceptibility to fright will be tested in a similar manner. Naturally a man in charge of a tram-car must not be easily frightened.

German Factory Tests

The tests which I encountered in the factories were similar to those just described. For instance, in one very large plant machinist apprentices were tested for accuracy of eye and hand by being asked to:

1. Indicate by a number the order of size of seven or eight holes of very nearly the same size drilled in a metal plate.
2. Arrange in order of weight half a dozen 2-inch cubes of different weights.
3. Arrange by sense of touch, in order of fineness of corrugation, a number of steel plates, while blindfolded.
4. Strike exactly on a line drawn across a lead plate, using a small pointed hammer, at the speed indicated by the instructor.

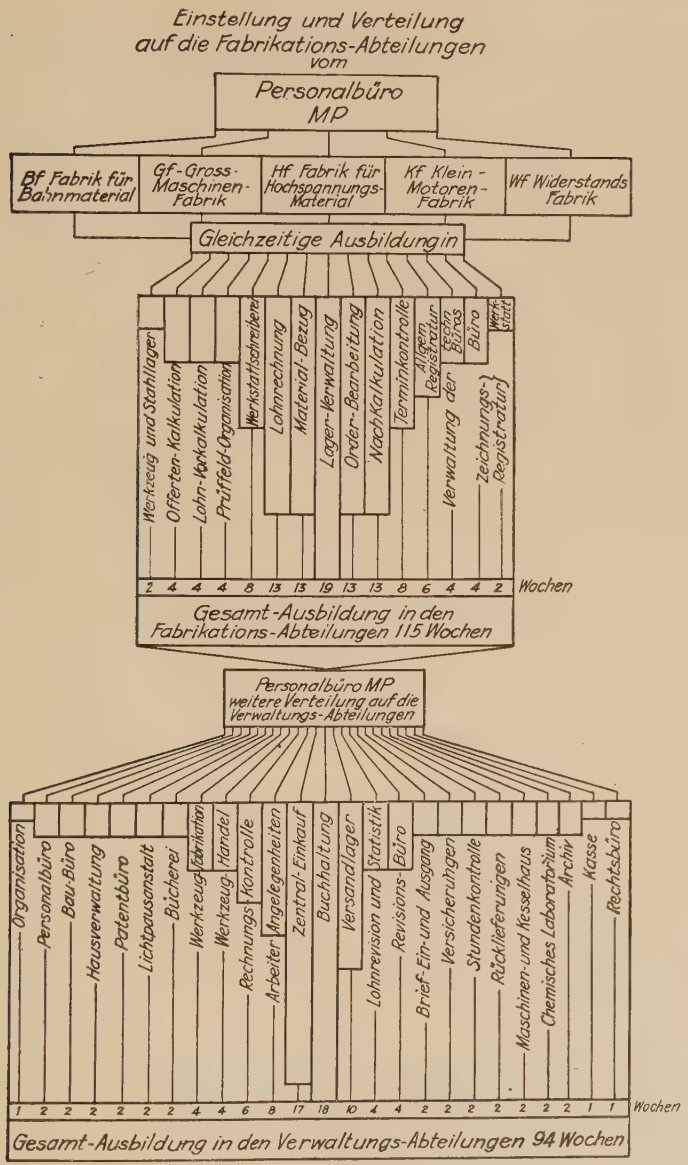

Figure 75. Diagram of the Apprentice Courses at the A. E. G. in Berlin

5. Look at a simple shape, such as a vase, and then draw an outline from memory.
6. Draw an exact circle free hand, and complete certain drawings of simple figures.
7. Fit together various puzzle shapes.
8. Make a simple tool from a drawing.

After successfully passing such a test as this and answering a series of test questions there would be little doubt that a boy would spoil a minimum of material and would shut down a machine to gauge only when absolutely necessary. Tests of similar nature I found in such widely differing plants as a locomotive plant, a machine tool plant, and a plant manufacturing electrical motors. In no case did there seem to be any doubt as to their efficiency either on the part of plant directors or of the teachers in charge of the factory apprentice courses.

Schools for Apprentices

Apprenticeship schools are much more common abroad than in America. In the A. E. G. two courses are given—one for the factory or manufacturing departments, and the other for the administrative departments. Each course is under the supervision of an employment bureau (Personalbüro). One bureau (see upper part of Figure 75) directs all the work carried on in the five factories—the factory for railways material, the large machine factory, the factory for high tension material, the small motors factory, and the resistance factory. Classes are conducted simultaneously in (Gleichzeitige Ausbildung) in 15 subjects, and constitute a 115 weeks' course. The subject to which the most time is given—19 weeks—is stores administration. (The number of weeks devoted to each subject are shown at the bottom of each section of the diagram.) Thirteen weeks each are given to figuring pay-roll, material orders, work orders, and costing. The work of shop clerks

and that of checking shipment dates is explained in two courses of eight weeks each. Six weeks are devoted to general files. Four weeks' classes are given in the preparation of estimates, pay-roll calculations, testing organization, administration of technical bureaus, and drafting. Tool and steel bearings, and shop files are covered in classes of two weeks.

The course for the administrative departments (see lower part of Figure 75) is only a trifle shorter than that for the factory departments, 94 weeks being required for the former as compared with 115 weeks for the latter. The most important subjects taught are purchasing and bookkeeping, to which 17 and 18 weeks are devoted respectively. Shipping stockroom procedure and workmen's affairs receive ten and eight weeks respectively. Six weeks are devoted to checking bills, and four weeks to each of the following subjects—tool-making, tool commerce, checking pay-roll, and checking office work. Practice and procedure in connection with the employment office, the building office, millwrights, the patent office, blue-prints, bookkeeping, in and out letters, insurance, checking hours of work, returns, the engine and boiler house, the chemical laboratory, and permanent records each receive two weeks. One-week classes are conducted in organization, duties of the cashier, and of the law bureau.

In Germany the apprentice school is one of the show places in every factory. The school rooms are large, light and airy (see Figure 76) and as you enter you notice first the absorbed interest of the boys in the problem under demonstration and then the lightning speed with which all rise to their feet and stand stiffly to attention as long as visitors are present or until they are requested to resume the lesson. Instead of the listlessness, the sniggering at visitors, and the lack of serious interest, which we regard as the privilege of childhood in America, we find in Germany a discipline which accounts for life and work being regarded as serious matters.

Figure 76. Work Done by Apprentices of the A. E. G. in Berlin

The system in Germany is to decide what is good for the state and then educate the child accordingly. Contrast this with some of our late "maintenance of the child's freedom of choice" fads under which our children are encouraged to be as lawless as possible in school in order to "develop their powers of self-expression" and are then parked at the movies where for the rest of the day they receive their real education from sex plays. Just where the worship of inclination and the disregard of duty—that disagreeable, but healthful old deity which the Pilgrims brought to America but which we relegated to the attic about twenty-five years ago—will lead us, remains to be seen.

Each German factory is also equipped with workrooms for apprentices, partitioned off from the general factory (see Figure 77). In one plant I visited there were 1,200 such apprentices. They begin work at about 14 years of age and for four years spend one day a week in the plant schoolroom studying the theory of their work and the other five days in the special apprentice workrooms, receiving small wages. The more promising are given special foremanship training.

In another plant there were 300 apprentices working on practically the same plan. In another there were 525, working 11 hours a week in the schoolroom and the balance of the time on the two or three floors of one of the buildings set aside for apprentices. They received .45 marks per hour the first year, .60 per hour the second, .80 per hour the third, and 1 mark per hour the fourth. Contrast this German boy, after four years' strenuous work under rigid discipline, taking his daily pittance proudly and dutifully home to his parents with our own typical youth, the senior at high school, begging a ride home in somebody's auto and hitting his father for a couple of dollars to give the girls a good time. Which boy will render the industries of his country more efficient when he gets a regular job?

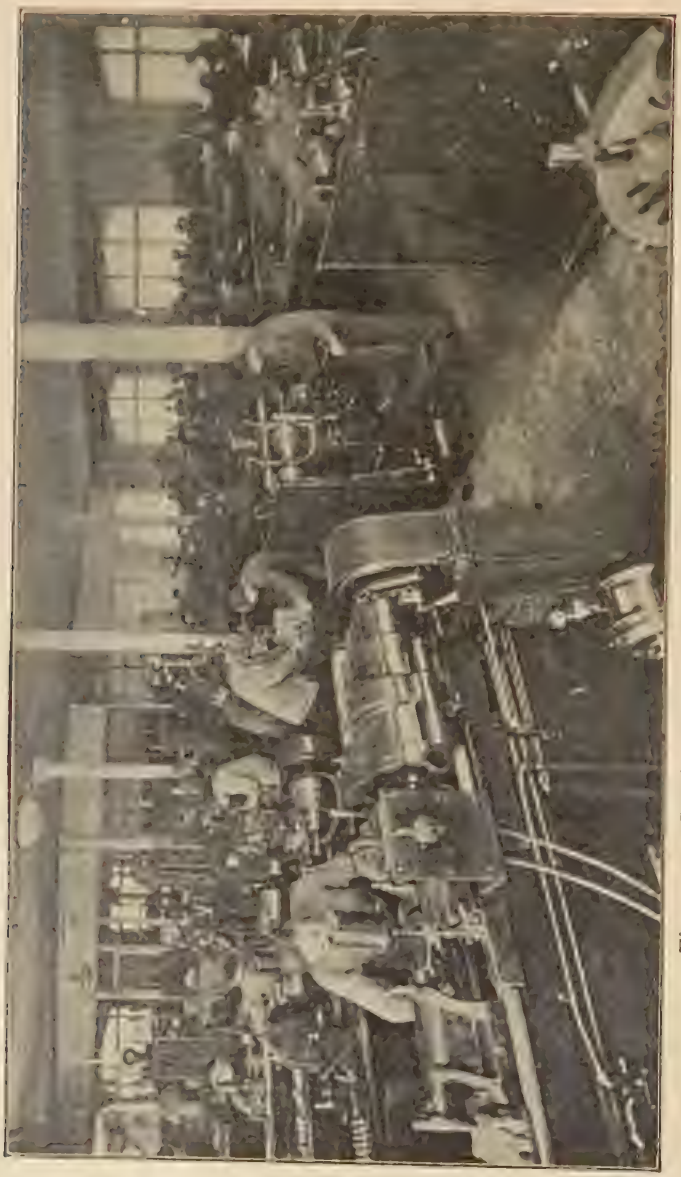

Figure 77. Special Shop for Apprentices of the A. E. G. in Berlin

In the plant just mentioned about twenty apprentices of special ability were taking special studies. All apprentices take the same course for the first two years after which those who display marked ability are given a special course. A training hall for foremen had just been fitted up for use in demonstrating, by means of illustrated lectures, new types of manufactured products, and the uses to which they would be put. Workmen were allowed to attend these lectures.

Result of German Industrial Education

And what is the result of German industrial education? Only recently I spent a couple of hours with an engineer who had worked until he was nearly thirty in one of the great German plants. He told me of a Swiss who was to arrive at the Potsdam Bahnhof with a special switch oil at 8:30 in the morning. At 8:31 he himself met him with a taxicab in which were two men to carry the oil. At 8:50 they arrived at the plant. The plant superintendent had the container ready and the wiring complete. At 9 o'clock the superintendent shouted *"Achtung!"* and all stood stiffly to attention while the current was thrown on. At 9:15 the sample was in the laboratory and at 10 o'clock—one and one-half hours after the train arrived—the complete report was in the hands of the *Direktion!* The vice-president of one of our own most efficient plants of this type heard of this and told my friend that the same test would have required three days in his plant. My friend remarked, however, to me, "Yes! And I, who have worked in both plants, know that the same test, which required an hour and a half in Berlin, would have required *three weeks* in America."

"Also," he said, "I have seen workmen in the Berlin factories—workmen, not foremen—figuring their wages by means of calculus! They are educated for what they are to be from the mother's breast, and whatever they are, you can be sure

they are competent to fill the position which they hold. They are trained for it; they are trained to do what they are told—and they do it. It produces a wonderful industrial efficiency, though it has drawbacks in other ways, as you know."

The English Education Act of 1918

At the other extreme there is the English system with the Labour Party getting out a primer of instructions to the labor unionists in which they say, under "Points to Be Watched,"—in connection with the 1918 Education Act:

> See that your Local Education Authority does not recognize "works schools" maintained by private employers as giving "suitable and efficient" continued education within the meaning of the act.
>
> The primary object of the new continuation schools should *not* be to impart specialized industrial or commercial training, but to give boys and girls a *good general education,* to develop their physique and character, and to prepare them for intelligent citizenship. See, therefore, that your Local Education Authority resists the pressure of industrial interests to use the schools to train the workers for industry.

There is a reason for Charles Schwab's statement in a newspaper article, April 20, 1921, that "Germany can put a ton of steel in England at a price $20 a ton cheaper than England can make it, and is selling pneumatic tools in Detroit where formerly we shipped such machinery to Germany and sold it cheaper than she could make it. The difference is solely a matter of labor cost." The question as to which policy takes a country further in the long run will be worked out in the next fifty years.

In England, under the 1918 Education Act (the Fisher Act which went into effect in January, 1921) all adolescents between the ages of 14 and 16 are required to attend a continuation school, for a period of 8 hours per week during working hours. Later this will be extended to the age of 18.

The Cadbury Brothers' Plan

Several companies started such schools five or six years ago. Cadbury Brothers insisted upon all workers under 16 attending a night school and instituted some day classes as early as 1906. At present this company's plan, operated under the direction of the local education committee, provides for two compulsory half-days at the continuation school for all boys and girls from 14 to 16, one compulsory and one voluntary half-day for those from 16 to 18, and special courses for office youths until 19 and apprentices until 21. The boys are taught English, physical training, arithmetic, history, citizenship, geography, science, wood- and metal-working art, town-planning, economics, etc. Girls are taught English, physical training, arithmetic, laws of health, sick nursing, infant care, housewifery, cookery, dressmaking, and psychology. (Seventy-five per cent of the girls employed are married in their twenties.)

Under the apprenticeship scheme the course is extended for those working at trades, and apprentices are trained also at the Birmingham educational institutions. Scholarships at the universities are granted in special cases. In addition there is a Bourneville works school where such subjects as box-making, biscuit-making, confectionery, office routine, etc., are taught. Foremen are given special training for 12 months after appointment in such matters as planning, etc. This same company has a sort of vestibule school where boys and girls are given special introductory training for a week, during which they are shown moving pictures of the gathering of the raw material, and are themselves studied carefully so that they may be placed most advantageously in the plant.

Other Training Schools

It is obviously impossible to consider the various types of continuation and apprenticeship schools in detail. We have

given in Appendix C the prospectus of a particularly large and well-run school. We would advise those who wish to go further into the matter to consult the bibliography in Appendix B, studying particularly the scheme of Lever Brothers, which is also under control of a joint committee representing employer and employee, and the analysis of education for apprentices given in Mr. Mensforth's paper, read before the Manchester Association of Engineers.

One of the most interesting training schools is one located in a large plant near Cambridge. For the factory employee there is a training section where unskilled workers are taught their trade, working the regular factory hours and being paid from the beginning. For the office employees various classes are conducted, varying all the way from elementary classes supplementing the school education to those for correspondents, salesmen, and managers. Employees who develop an aptitude for accounting are given an arithmetic and bookkeeping course which includes also law and business procedure. The correspondents are taught shorthand, English, and certain technicalities of the business. A good deal of time-study work has been done in connection with the office work in this concern and a special motion-eliminating desk has been worked out, which correspondents are taught to use. One of the interesting features of the salesmen's congresses held by the company is a large disc with an arrow, which is placed on the stage behind the men giving sales demonstrations. The arrow is turned to indicate the various stages of the sale, such as "the approach," "awakening interest," "closing the sale," etc. This permits spontaniety on the part of the salesman demonstrating, but impresses the analysis of the various stages of the sale upon the members of the audience. The company also gets out most complete printed sales talks with ways of meeting every possible reason for not buying which the customers might advance. In addition there are various recrea-

tional classes in elocution, drama, singing, embroidery, etc., governed by committees of employees.

At another plant near Manchester I found a well-organized vestibule school for training new employees. At another plant in the same district sixteen foremen had just returned from a week's study of labor economics at the university of Oxford. At still another plant—a unit in an enormous consolidation—a special feature was being made of plant visits for foremen, who were encouraged to visit the more modern plants of the company and to discuss their problems with those in charge.

Debating Societies

One of the most interesting educational developments in England is the debating society for employers and employees. The fundamental value of such organizations, which are run under various names, lies in their permitting the owners and the workmen to come together and get acquainted and to thresh out, in generalities, questions, which if discussed in terms of conditions at a single plant would result in acrimonious accusation on both sides. Some of these societies are formed as research societies, others for philanthropic or social purposes, but the results in all cases are the meetings of both sides to the labor controversy on neutral ground, and the discussion of subjects of interest to both with a view to mutual education and understanding, leading to harmony and industrial progress. The Garton Foundation and the Manchester Engineering Council are typical examples. The latter consists of workmen, trade union officials, employers, and educators, and the governing boards are made up impartially, containing both radical labor leaders and owners of plants. It is much harder to hate a man you meet personally twice a month for the discussion of subjects of mutual interest than it is when your only knowledge of him is gained from a line

in the newspaper which says he has just gone to Palm Beach—or that he has led a howling mob in an attack on the works. America has a lesson to learn in this respect from England.

Education of Managers

The education of managers is carried on in university courses—the Manchester School of Technology has a course in industrial engineering—and in the various engineering society meetings which are addressed by the leading industrial figures of England where such subjects as scientific management, educational and safety methods, and like matters are discussed and debated in great detail. F. M. Lawson states in his book on industrial control:

> The captain of a ship must possess a master's certificate which in itself embraces ability, conduct, and fitness; but to be a director of a business no such qualifications are demanded. At the same time qualifications for directorship of any business should be demanded, because life may be lost as easily by inefficient direction in a factory as by inefficient direction from a captain.

The British government's publication, "The Future," circulated late in 1919, states:

> I should know for certain that there was a good time coming for the workers if I could learn of men striking because their "boss" was a poor hand at bossing! Workers simply cannot afford to have inefficient employers.

Messrs. Fleming and Pearce in their series of articles on "The New Management," state:

> It follows that a most important factor in the new management will be education both for juveniles and adults, which will be afforded during industrial life. This education will provide a basis for understanding of the principles on which industry rests and of its economic structure. It will reveal many features which will be new to the average worker and will explain many points from which false conclusions are now drawn. It will teach that experience and understanding

are necessary in responsible control of industry. This will result in the removal of suspicion and mistrust, which is still a fruitful cause of friction in industry, and will facilitate the establishment of cooperation between all grades of workers. Workers must be taught the elements of economics so that they can see the fallacies and exaggerations of partisan economic propaganda.

L'ouvrier qui fait grève paralyse la production et fait tort au pays
L'ouvrier qui fait grève se fait tort à lui-même
GRÈVE
Réveil Economique

The workman who strikes paralyzes production and injures his country. The workman who strikes injures himself.

Figure 78. French Educational Posters Showing the Effect of Strikes Upon the Workman

French Apprenticeship Schools

France is rapidly developing commercial schools. These vary all the way from the École Superieure Pratique de Commerce et d'Industrie, founded in 1828, to the École Commerciale des Jeunes Filles, founded in 1916. In the former youngsters from twelve upward are taught such subjects as French, hotel management—with field work in Paris hotels—banking and business administration.

Apprenticeship schools of a very fine order exist in the larger and more modern French industries. One such admits boys and girls at from 9 to 12 years of age. At 13 they are given an examination for high school. Those who fail are given another year at the apprentice school and then try for high school again. If they fail they go to a second apprentice school, which fits them for the more ordinary sorts of work about the plant. Those at the high school are given training for clerical and similar positions. Those showing special ability in the high school are sent to the technical universities to be trained as engineers and department heads. Girls are given special courses in such studies as domestic economy.

Education in the methods of scientific management has for several years formed part of the training of the French government engineers. The students are not only given lectures by competent industrial engineers—men like Henri le Chatelier and Charles de Freminville—but spend their vacations at St. Nazaire, Le Creusot, and at other plants where scientific management methods are installed. Lectures on the subject are given at the Sorbonne—in fact I discussed a good many phases of the work with an American major who was attending such a course and found that it was being taught in much the same way as at our own more progressive universities.

Industrial Education in Italy

Some of the technical and commercial schools in Italy are very old—for example, the Scuola di Incoraggiamento Arti e Mestieri in Milan, which gives courses in spinning, weaving, and applied mechanics, was founded in 1844. The Regia Scuola di Tessitura e Tintoria della Provincia di Terra di Lavoro in Arpino makes a specialty of training foremen. Creches and primary schools for the children of workmen are usually found in the more progressive factories. The

Pirelli educational department is located in a beautiful old palace which stands close to one of their Milan plants and contains a modern library. The Giovanni Rossi plant is especially well provided with such schools.

The Future of National Industry

The American army intelligence tests showed that of 1,700,000 men tested, 4½ per cent received an A rating, 9 per cent a B rating, and 16½ per cent a C+ rating—30 per cent in the first three grades selected from the flower of the country. What would be the improvement in American industrial efficiency if two-thirds of our men came in the first three grades of intelligence—were trained to be experienced workmen and possessed physiques and moral characters of sufficient strength to enable them to realize continually upon their intelligence and training? The future of national industry and, since each nation has become industrial, the future of civilization rests upon the steps which our industrial leaders take to educate the community in these four things—common sense intelligence, technique in industry, physical culture, and moral strength.

CHAPTER XVII

SHOP GOVERNMENT AND PROFIT-SHARING

Democratic Control of Industry

It has been said that the nineteenth century marked the struggle of the common man for recognition in the industry, while the twentieth century will mark his struggle for the control of industry. Events of the past five years seem to point to the correctness of this conclusion. As the common man has become better educated and as means of communication—the press, the telegraph, and transportation—have brought towns and villages 10,000 miles apart as close together mentally as were the opposite suburbs of Paris at the time of the French Revolution, the common man has been basing his conclusions upon facts, to a much greater extent than was possible when he knew only what those in control thought best to tell him. Such remnants of absolute monarchies as outlived the nineteenth century were cleaned up in the World War. The logical result of the democratic form of government, which rests upon complete enfranchisement—one vote to one adult—is control in industry as well as in government.

Intelligence vs. Numbers

The battle of the ages has been that of the "ins" against the "outs," of the "haves" against the "have nots." Victory is a matter of intelligence, organization, and numbers. When a victory is won by sheer weight of numbers—without intelligence or without organization—we have the chaos of Russia with nothing left for anybody. Where intelligence has prevailed the advance of the masses has been by peaceable and legal means—the laws being altered to suit the will of the

majority as the majority has been educated to obtain greater benefits by means which will not wreck the existing civilization. Just now we are suffering a reaction from a too rapid advance. Russia went on the rocks. Italy nearly went on the rocks, and the mutinous sailors in other ships have turned to their captains for help until they have themselves learned more about navigation.[1]

Wise captains of industry have realized for some time the trend of affairs. They have been making themselves solid with their crews. The activities which they have utilized have assumed several forms. Welfare work was the first form of conciliation. This was followed by profit-sharing. The latest phase is the works committee or workman's representation plan. Meantime the old guard of the besieging army—organized labor—has stood on its hind legs and howled in derision as more and more valuable possessions have been thrown over the battlements to the beleaguers in the hope that they will go away satisfied. The battle has waxed and waned—sometimes with the advantage to the intelligence and organization of the "haves" and again to the numbers of the "have nots." As the "have nots" have increased in intelligence their gains have been greater and more permanent. They have learned to view the situation more calmly—to realize that evolution by education will net them more in the end than revolution by force. They have learned to respect the abilities of the management and to recognize the part which capital, credit, and finance play in modern industry. Meantime employers everywhere have also been learning something.

Profit-Sharing—Appeals and Operation

To some employers the fact that union labor disapproves of profit-sharing is sufficient recommendation. To others,

[1]H. G. Wells, "Outline of History," The Macmillan Co., New York, should be read by every voter in every country.

the appeal of the plan is purely altruistic. To the great majority, however, who have considered the matter at all, it seems to offer a solution of the growing social unrest through making the interest of the employee and employer identical. It is on this ground that the subject has lately created considerable interest among far-seeing employers, who realize that now that the working man has begun to capitalize his power through the efficient use of his vote, the labor question will more and more dominate the industrial situation.

Failures in the successful operation of profit-sharing plans seem for the most part to have been due either to an imperfect understanding on the part of the employer of the laboring man's viewpoint and psychology, or—where an honest effort has been made to reach this and to deal with the problem with thoroughness—to a tendency to lump human nature and to make too little allowance for its behavior under unforeseen circumstances.

Spread of Education and Radicalism

Too many employers regard their employees as dependents who ought to be glad of any crumbs which may be thrown to them. Such employers make no allowance for the fact that education has become general, and that a vast literature, telling the working man that what he would *like* to believe is true, has been prepared for him by those who have an axe to grind as well as by those who have his welfare honestly at heart. The more radical of labor's advisers, from their soap boxes on street corners, have been painting terrible pictures of the greed of the capitalistic class, and the reading-rooms of our libraries are filled with gentlemen with flowing ties who earnestly scan history to discover the base motives of former malefactors of great wealth. The average employer—decent citizen, father of a family, subscriber to charity, and supporter of the church—would be horrified if he

knew in what colors he was painted by these gentlemen of the flannel shirt and slouch hat, and how many of his workmen listen to these advisers and read their pamphlets.

Human nature likes to be told it has been wronged. It is so much more palatable to believe that some brute is withholding from you your rights, than it is to be told you are lazy and improvident. Most of us have to have our thinking done for us; and what the village minister did for us sixty years ago, our newspapers, our pamphleteers, and our soapbox orators are doing for us now. The working man likes to be told that presently the boss will walk and that he will ride. Little by little, more and more radical doctrines have been preached until certain branches of organized labor state frankly that their goal is confiscation of the factories which they feel belong to them. Under such conditions, the spectacle of our pursy little capitalist offering a present of a few dollars at Christmas and calling it profit-sharing is as absurd as that of an early Christian in the arena attempting to placate a ravening lion with a caramel.

All sorts of schemes have been devised to quiet the murmuring lion—from Colonel Weatherby's "Give 'em the grape, by Jove, that's what the beggars will understand," to communistic experiments which usually ended in the 10 per cent constitutionally energetic finally refusing to do the work for those who insisted on lying in bed and meditating on the millennium.

The Rights Implied by Profit-Sharing

Gifts at Christmas and other dispensations to dependents are commendable; they display in many cases admirable generosity and reflect great credit on the giver. In history, many beneficent despotisms have contributed greatly to the progress of the race, and those living under the despot have been prosperous, happy, and well treated. But profit-*sharing* implies

partnership—a community of interest founded upon certain rights possessed by each partner, by capital and by labor. It is the discussion of these rights which causes the trouble.

Take a hypothetical case for instance. I inherit $100,000 which I invest in a business of which you are the manager. I pay you $5,000 a year, and you hire 100 men at wages aggregating $100,000 a year. My capital is my $100,000, which I could invest in mortgages or in bonds with perfect security and draw 5 per cent with absolute regularity. Your capital is your ability and experience. As this earns you $5,000 a year, your capital may be said to be also $100,000. The employees, each earning $1,000 a year, may be assumed to possess in their strength and ability $20,000 "capital" each. Suppose we decide to share all profits on that basis after we have each drawn our 5 per cent on our "capital." That sounds logical, doesn't it? The first year the business earns profits of $15,000, which leaves $10,000 to be "shared." We split this in proportion to our "capital." Labor draws $9,090, you as manager draw $455, and capital represented by me—draws $455.

Can't you imagine my howl when asked to be content with a beggarly 4½ per cent of the year's surplus profits, 4/10 per cent on my inheritance—my arguments about "business risks," "the reward due enterprise," etc., etc., the manager's and the employee's retorts about "continuous employment risks," and the "reward due their efficiency and endeavor." It would be only a step further to an acrid discussion of my right to spend my days on the golf links in idleness, while you and your men sweat in a dusty and noisy factory; and before we got through we would have split in a row over questions of "rights of inheritance" and "property held only on suffrance." Very likely you would end with our friends of the extreme left—you and your laborers wouldn't be content until I sweat in the factory and you played golf.

And yet the greater number of profit-sharing schemes propose to content the employee with a "percentage of his wages equal to the dividend earned on the capital"—interest on interest, instead of interest on capital.

The employee regards fairness of this sort in much the same light as would the lion if the early Christian had said, "Here, we are partners, let us split this caramel and be satisfied." As a result, when the would-be divider of profits has clambered up the barricade and taken refuge behind the safeguards of law and order, Mr. Lion begins to plan alterations in the design of the arena and in the rules under which the guards operate. In other words, he goes to the legislature with his troubles.

The trouble is that profit-sharing proposals bring up a lot of questions for discussion whose answers we do not yet know —questions which will require generations of thinkers and endless experiment to settle. Like the Irishman, we are all prone to believe in an equal distribution of wealth up to the point where it necessitates the partition of our pet pig—then we disagree violently. Under the circumstances, it is a question if frank largesse—a shower of gold from the king at Christmas—hasn't quite as beneficial effect in the long run upon both capital and labor as an elaborate system which awakens the suspicion of the laboring man and raises the question of what is fair between those who have and those who have not.

History of Profit-Sharing Schemes

Attempts at devising a successful system of profit-sharing, which is usually defined as "an agreement between an employer and his work people under which the latter receive, in addition to their wages a share, fixed beforehand, in the profits," began in 1838. Of 380 such schemes, employing 243,000 men, which have been put into operation in England,

since that time, 182 still survive. Of the 52 per cent which failed, 51 per cent failed because of apathy of employees and consequent dissatisfaction of employers with the results. Twenty-seven per cent failed because of low profits, 14 per cent because of changes in or transfer of the business, and 13 per cent for miscellaneous reasons.

A recent survey of profit-sharing schemes in America describes some 42 plans which are in more or less successful operation. In addition, 45 stock ownership plans, some of which include profit-sharing features, are given, and some 130 special distribution or gratuity plans. Thirty-nine plans which have been abandoned are also described. An analysis of these last shows that 10 were abandoned on account of labor troubles and strikes, 7 because the employers considered them unsatisfactory or unfair or had decided that some other plan would be better. Five were given up because of failure under diminution of profits, 4 on account of lack of appreciation on the part of employees, 2 because the business changed hands or was discontinued, and 1 because the employees sold out their stock on a war market. The reason for 8 abandonments was not stated.

Opinions of Employers

Opinions of a few employers are enthusiastic. A number complain of the difficulty of gauging results and the failure of the workmen to respond, but feel on the whole that their plans have proved successful. Some of the advantages cited are that more regular attendance is insured, the company is enabled to keep employees during the rush season, a better spirit is created among the workmen, and the profits of the business, loyalty, and co-operation, and so forth are increased.

Various objections made by employers to profit-sharing plans include the criticisms that employees often fail to grasp the significance of such plans, that they become dissatisfied

when the profits are small, that they spend anticipated bonuses in advance and become extravagant, and that they sell stock to outsiders. In one instance the employees demanded a voice in the conduct of the company's affairs.

Many of the American plans are so new that their creators are still in the first flush of pride at their creation. For this reason and because their relatively short period of existence has prevented thorough tests, the data in regard to failures and such analytical criticisms as are obtainable really indicate greater experience and deeper insight into the difficulties of the problem than enthusiastic letters in regard to schemes just installed.

Fundamental Difficulties

It was the writer's privilege a few years ago to study the operation of a profit-sharing plan over a period of several years, and to have during that period the confidence of the firm as well as that of the employees. It was a most illuminating experience. For the benefit of those who wish to give further consideration to the causes of failures we have included an account of it in Appendix E.

Determining Shares. This failure illustrates most of the faults which are fundamental with profit-sharing under the accepted definition. We have the awakening into consciousness of the problems of modern society—what is labor's share and what is capital's share? What are the rights of property and of inheritance? "The company says it wants to be fair. Does it? Or is capital simply at its old tricks again—trying to put one over on the laboring man." Suspicion is born. Efforts on the part of the management to explain involve the statement of certain facts in regard to the necessity of certain policies. Elegantly dressed salesmen traveling in Pullmans, stopping at palatial hotels, and motoring with prospective customers, look like loafers to the working foreman who arises

at 5:30, wears overalls, and walks to save carfare. How are you going to make him see that a salesman is working ten times as hard as he is himself, and is entitled to ten times the salary, when the activity is all going on inside the salesman's head? How are you to make him see also that what a foreman may regard as luxury is such an old story to the salesman that it bores him to death—besides giving him indigestion?

Explaining Business Policies. Business policy in a large corporation has become such an intricate affair of late years that the biggest men in the company can hardly understand it themselves. How are they going to explain to a minor executive exactly why they favored expansion at one time and retrenchment at another. Even when their reasons can be expressed, there is a large chance that the step will be untimely. Who allowed for Armageddon on July 1, 1914? The writer sailed from Montreal on the twenty-fifth, with Villa in Mexico the biggest disturber of peace on the horizon, and ten days later landed at Liverpool with the world at war. Business men understand this element in affairs, which formerly caused commercial activities to be classed as "ventures." But how are you going to explain to a workman that—"you are very sorry—you know he worked 25 per cent harder than anyone else and that he did much better work than ever before—but unfortunately a rise in the cost of rhodium, caused by certain activities of the tribes in the Ural Mountains, had made it necessary to change your process of hardening steel, and therefore sales had fallen off to such an extent that you wouldn't be able to reward him this year, etc., etc."? Can you convince him that he must excel his performance next year, especially when he was counting on that cash to lift the mortgage on his house or had already spent it for a piano?

Time of Distribution. Even if the workman can be made to believe that the amount set aside for him *is* his share of the profits, there is the dilemma as to whether to vitiate such spur

as this to efficiency, to loyalty, and to ingenuity, by withholding his share until such time as habits of saving shall have had time to form, or to pay in cash and have him "blow it" or discount it by going into debt. Even if you pay in cash, payments are seldom made until the annual balance sheet is prepared, and it is a long time from the first lazy days of spring until December when "the ghost walks." Constituted as we are, the immediate and near pleasure is usually stronger in its appeal than the remote and uncertain reward of the future. Firms who have tried even the semiannual payment plan have given it up in disgust because the reward was so remote from the effort that cause and effect were invisible to the workman.

Indiscriminate Distribution. The worst element of the whole thing is the comparatively indiscriminate distribution of the reward. Even where an effort is made to share only with a carefully selected and deserving few, there is always the case of the man who slacks. As soon as Jackson sees Brown loafing, he is sore. He may at first reason with his constitutionally tired comrade, but sooner or later Jackson concludes that *he* isn't going to kill himself working while Brown enjoys himself and later pulls down just as much as he does. He therefore eases up a bit himself, and it isn't very long before the race is not to see who can do the most work but rather to see who can do the least work and get away with it. In other words, conditions were just where they were when profit-sharing was introduced. This is also the chief difficulty with the gratuity plan. There is no heartburn worse than that of seeing a man you don't like get just as much as you do when he doesn't deserve it. A continued repetition of such situations not only raises doubt of the firm's judgment in the mind of the conscientious worker, but is a positive incentive to disloyalty.

Demand for Share in Management. Several instances have been cited where an opportunity to share in the profits

aroused among the employees such an interest in the company's affairs that they felt they should have a share in the management and in the determination of policy. That is the logical sequence of events in the successfully launched scheme. A taste of the profits—if, in the mind of the worker, it is connected with his activities at all—induces extra effort on his part. For this he expects, quite naturally, to be rewarded. If his reward is not commensurate with his effort, he begins to investigate. The company must then choose between the dangers of awakening his suspicion by refusing to open its books to him and thus share with him the innermost secrets of its business, which in turn would have to be made the general property of all participants, and the danger of his misunderstanding the intricacies of a complicated business and going back to the men with a mass of criticism, personal and otherwise, which will give rise to a dissatisfaction so general as to lead to a serious crisis.

When profits fail, there are always alarms and excursions. Anyone who has tried to explain the reasons for such failure to a mob of injured stockholders will realize the difficulty of making a group of workmen in a large corporation comprehend the good and cogent reasons why their extra effort—the sweat of their brow and the abrogation of their recreation—should meet with no reward. When in addition there has been some mistake in policy, an injudicious sales campaign coupled with a large advertising expense for which the sales manager is responsible, an unwise change in the manufacturing process made by the general manager, or an untimely expansion of the business advised by the directors—and such of us as do anything, do make mistakes—it is next to impossible to put anything into words which will make the workman see why he himself should be penalized. Under such circumstances the survival of the profit-sharing scheme assumes the aspect of a miracle.

Efforts to Overcome the Difficulties

The reasons for the failure of profit-sharing schemes so far given have been fundamental—the arousing of questions of human rights, which we are yet unable to solve, tendencies of human nature which make the workman feel that *his* work is always the most galling, lack of understanding of problems outside his sphere, the difference in viewpoint between the man who has his principle between himself and starvation and the man who has nothing, the equal distribution of the reward between the just and the unjust, the control of exertion but not of results, and, most important of all, the lack of reward in proportion to effort and accomplishment. Schemes which may be said to have succeeded, have been successful in spite of these reasons, on account of the personality of their originators and the established probity and ability of those in control, on account of peculiar or favorable business conditions which have been conducive to their survival, because of the smallness of the enterprise, or because they have not existed long enough to have passed the ordeals by water and by fire.

Efforts have been made to overcome these difficulties by providing for every contingency. The result has been a contract which only a lawyer could comprehend. To the working man such a document at the best can appear only as a sort of complicated raffle from which he may draw a prize. If he trusts the boss and the boss says it's all right, he will take a chance; perhaps he will be fortunate, but the connection between how hard he works, how little he wastes, and how ingenious he can become and what he receives in return for his extra effort is so remote that it never occurs to him. There is no question that our groping in the dark has been commendable, and that our employers and corporations have been honestly endeavoring to meet a situation and to destroy antagonism which has been unfortunate alike for employer and employee, but the solution is not yet.

Stock Ownership

Another expedient adopted to enlist the employees' interest has been some plan by which he becomes a stockholder. Sometimes this is arranged in connection with a profit-sharing plan and sometimes he is encouraged to buy stock by means of a low purchase price or in some other way. The majority of the United States Steel Corporation's stockholders are employees —some 100,000 of them owning stock in the company. There are 135,000 individual shareholders in the Bell Telephone Company, one-fourth of whom are employees. Six per cent of the Lehigh Valley Railroad's employees are stockholders. Employees of a certain Chicago department store own over $2,500,000 worth of its stock. Eighty per cent of the employees of a large worsted-mill are stockholders, 75 per cent of the employees of an equipment company, and 90 per cent of the factory force in a large shoe plant. A great deal of the capital stock of British cotton-mills is held in small sums by spinners and weavers.

The problems which have to be met in such cases are much the same as in the case of the profit-sharing schemes. As long as times are good and wages are equal to those in the neighborhood, employees are glad to get the extra money from dividends. When times are hard, difficult explanations are necessary. The connection between individual effort and money reward is quite as remote as in the case of profit-sharing.

Shop Government

The most popular and widely discussed method of enlisting the interest of the rank and file employee and furnishing him an opportunity to remedy any evils of management which exist, is at present the shop government or workmen's committee system. Such plans vary all the way from one I found in France where each department head called the representatives

of his men together once a month and inquired as to whether there were grievances, to those in which the books of the company are thrown open to duly elected representatives of the men, and machinery is arranged by means of which disagreements between the representatives of the men and the representatives of the management can be arbitrated by outside and impartial tribunals with the ultimate decision binding upon each.

Soon after America entered the war there was a perfect epidemic of such schemes, fomented in a good many cases by the world-wide fear of Bolshevism. In the name of "industrial democracy" manufacturer after manufacturer devised schemes and put them in overnight. Each proud parent was wildly enthusiastic over his child and praised it to the skies. One such manufacturer described his millennium of 90 days' duration to a large gathering of labor specialists and returned home to find his plant in the throes of the biggest strike in its history. Another man told me he was running paid advertisements in all the papers describing his plan and that it was increasing his sales tremendously. Some manufacturers offered their employees "participation in management," which turned out to be the sort of participation which a sheep enjoys in the operations carried on in a packing house. We went in for industrial democracy with almost as big a whoop as when we entered the war.

The inevitable reaction followed. Organized labor inveighed against "company unions" and branded industrial democracy as a gold brick used to fight unionism. The gold wore off the bricks in some cases, and the schemes were thrown out. Some manufacturers faced the music and when the "legislative bodies" voted themselves the inevitable raises, took the men to the company's books and showed them exactly why further raises were impossible. One company in Cleveland even went so far as to hire an ex-labor union official to instruct

the workmen in the intricacies of its books. This man—who was thoroughly trusted by all the men—actually held classes on company time at which the men were brought into a hall in groups and by means of blackboard figures were shown just where the money went and why. The company paid stockholders 8 per cent on the investment and all the rest went into reserves to stabilize employment and into wages. In this particular case, as a result of the thorough handling of the difficulty during the war wages were more than doubled, costs increased only 10 per cent, and labor turnover dropped to almost nothing.

Workmen on Boards of Directors

Some companies arranged to have workmen elected to their board of directors. Red hot electioneering, with posters showing "the workman's friend" laying down the law to a scared and cowering directorate, was the order of the day. Once the excitement was over the workman sat on the board with all the understanding and influence of a farmer who has mistaken a discussion of relativity for the meeting of the Milk Producers' League. The sum total of constructive work on the part of one such "working man's friend" was a resolution to the effect that his boss's pay should be raised! When his term was up he couldn't have been elected sponge-holder at a dog fight. Nevertheless, pathetic as it was in a way, the effect was to promote understanding between labor and capital. The experience showed labor that there was no dirty work done in the mahogany boardroom and demonstrated the absolute necessity for education and specialized knowledge in order to manage industry. It was a lot better for everyone than to have had the company wrecked by labor troubles brought on by inflammatory speeches from some half-crazy agitator, simply because the employees didn't know what went on in the boardroom.

Lines of Development

On the whole the development of industrial democracy seemed to follow three main lines:

1. Participation in management plans, under which the employees elected representatives who met the representatives of the management as equals, with provision for impartial arbitration, binding to both parties, in case of disagreement.[2] Books open.
2. Shop committee plans, which were designed principally to enable the workmen to get their grievances before the management. The management in this case frankly reserved the right to veto without question. Books closed.
3. Various temporizing plans of the "gold brick" variety, which led the employees into thinking that they were to have a say in the management of the business but which—after the elaborate and involved charters were put into actual use—developed certain jokers, resulting in the management retaining all the power.

Requisites to Participation in Management

The difficulty which the working man encounters as soon as he attempts to participate in management is the same which the farmer would meet should he attempt to participate in the discussion of Einstein's theory. You cannot participate in a discussion until you know something about the subject. In a previous chapter we referred to the Manchester machinists who begged for lectures on finance after hearing the expert from London. We cited the case of the workmen who spent a day in the plant timekeeping office finding out why they couldn't be paid off in full each pay day. A shipyard was offered one of the English unions at a nominal price after the

[2]The impartial chairmen in the garment industries were selected by representatives of all the employers and of all the employees in the district.

war. The workman who told me about it said: "They were far too downy to be let in for anything like that." American trade union officials have stated time and again that the unions wanted nothing to do with participation in management. They prefer the unmolested right to organize and "a living wage"—not the troubles and problems of management. The Virginia iron plant which was financed, controlled, and managed by its union workmen went into the hands of a receiver last January. The employees of a New England jewelry firm refused to take over the plant when it was offered them on extremely advantageous terms. The workmen who seized the factories of Italy last August turned them back upon encountering the difficulties of management.

Some day the workmen may exercise real and active control of the management of industry. The rank and file have, however, a long road of education to travel before they can take an intelligent part in the higher activities of management. As yet even the best of managers are ignorant of the underlying causes of economic phenomena upon which the prosperity of each business rests. We have been working nearly three years to find a solution for the tangle of international exchange. How many men foresaw the November, 1920, slump and got ready for it? Intelligent workmen, both in America and in Europe, realize their lack of education and of business training and the far-sighted ones are already taking steps accordingly. Meantime participation in management is confined mostly to shop matters—wages, working hours, and shop conditions generally.

Participation in Management in Italy and France

The Italian government is at present engaged in working out some scheme by means of which the workmen can "participate in management." In one of the large plants I visited in July the manager explained to me that the men elect an

internal commission every two years. This commission meets once a week with the management to take up matters affecting working conditions. A great point was made of insistence that the workmen elect representatives who really represent them—responsible leaders whose agreements they will live up to. In case of a dead-lock between the committee and the management the dispute is taken before the general workmen's confederation and the employers' association. My informant complained that most of the labor trouble began in the unprogressive and reactionary plants.

In France such councils are not at all common. In one plant I visited, each shop elected delegates who met with the department chiefs once a month. I was told there were no grievance committees, no closed shops, and that comparatively few plants had any sort of workmen's representation plan.

The *conseils des prud'hommes* are very old, however. The first one was created by the law of March 18, 1806, which provided for the establishment of such a council at Lyons. They were established in Paris in 1847. In 1908 the Paris council was reorganized into five autonomous sections which have to do with industrial matters and one which has to do with commercial matters. Each of the sections includes a large number of categories of professions and industries and is composed of an equal number of employers and employees elected by their respective classes. The presiding officer is taken in alternate years from the employers and from the employees. The primary object of the *conseils des prud'hommes* is the settlement of disputes—usually trivial—between employer and employee. Very often servants unjustly discharged seek redress. Appeals from the council's judgments may be made when the amount involved is over 300 francs.

In Italy I found one so-called profit-sharing plan which seemed to be working admirably. Payments were made monthly on a basis of total production and a workmen's com-

mittee ejected workers who refused to co-operate. I was told that such plans were rare in France, although co-operative plans were common both there and in Italy.

The Whitley Industrial Councils in England

In England I made a special point of investigating the working of the Whitley Industrial Councils, as there has been a tendency in America to regard this plan as a general panacea capable of curing all industrial ills. Advocates of various works council schemes and uplifters of various sorts have used it as a club to drive American manufacturers into workmen's representation plans and it has been very much advertised. I therefore talked with all sorts of people about its success and quote the following more characteristic replies:

The head of the industrial relations department in a large plant made the following comments:

> All right but nothing wonderful. Something of the sort was necessary in order to get action on local matters which formerly had to be taken up with the headquarters of a dozen or more separate unions. Has busied itself mostly with such things as petitioning the local authorities to change tram schedules, traffic regulation, and the like. The more vital matters, such as wages and working hours, are still settled with the unions. Inasmuch as all Whitley council members are members of the union—many of them being union officials—there are naturally no conflicts between unions and councils. It is making the employers take more interest in the desires of the workmen and so is on the whole a good thing.

The managing director of a very progressive plant said:

> It is a very good thing as it gives the workmen the local government which was impossible where everything had to be handled through the fifteen different unions in the works. The Whitley works committees are quite generally organized. The district councils, which under the plan were to consist of representatives elected by the workmen and

employers of all the plants in each industry, have not come to much. Nothing has as yet been done toward organizing the national council made up of representatives of employer and employee delegates from the district councils. Our own works council meets monthly, alternately on company time and on the men's time, there being six representatives of the workmen who meet with the management. So far the plan has worked very successfully.

An official of a large steel plant stated:

Our works council which has been organized for over a year consists of three representatives of the management, two of whom are directors, one foreman, and six workmen, each of these elected by a different department. The committee meets every two weeks. The management, of course, reserves the right of ultimate decision. The only time the question of the workmen participating in management arose was when we were drafting the constitution, when one or two radicals brought it up, but we, of course, wouldn't consider any such thing.

An official of a large and modern plant had this to say:

We had a works council before the Whitley plan was formulated and it has worked very satisfactorily. There is no attempt upon the part of the workmen to take part in management. Local welfare matters which cannot be handled effectively through the ten or fifteen union headquarters are worked out by the councils very satisfactorily. You will find a good many works councils in the various plants but very few for the various industries (district councils). The Whitley council for Great Britain has not yet been organized.

An official of a plant noted for its welfare work said: "We have no trouble with our council which is naturally persuaded to the management's viewpoint."

An official of another steel plant remarked: "We won't listen to any of these workmen's committee theorists."

A man of outstanding ability and great experience in labor matters in a strictly neutral position commented as follows:

The difficulty with the Whitley plan is that it is too complete and too nicely worked out. It is as if a group of highly educated but inexperienced university men had gathered together and worked out something which was beautiful on paper but rather too academic for real life. If they had built their scheme around what already existed instead of attempting something absolutely new their progress would have been much faster. You will find a long published list of companies who have councils but you will find a great many of the names of the larger and more powerful companies absent.

The managing director of a large and progressive company said:

The Whitley Councils have got nowhere in the Engineering Trade. The Unions strongly opposed the organization of such councils as they desired the unions to be the starting point. The Shop Stewards were at first the representatives of the unions in a shop or a department who collected subscriptions for the unions. These are practically extinct. The Shop Steward Committees—known as "the unjust stewards"—were a sort of outlaw organization that got in during the war. They were largely Bolshies and fought the unions.

An official of a plant in Manchester stated:

Our plan grew out of the shop steward committee movement, the committee, composed of union men, gradually becoming the Whitley Works Committee. Both men and women are elected to the committee, each department electing two stewards—a man and a woman. These representatives elect a committee of six who meet with the management and do the work of the company's old Welfare Committee. They meet once a month on two hours of company time. If the meeting lasts longer it extends beyond quitting time and is on the workmen's time. Union matters, such as wages, are also discussed but many things have to go to union headquarters for approval. There is a chance of course of the movement splitting the union. At our plant there has been no attempt on the part of the committee to take part in management.

The Workshop Committees—An Employer's Analysis

Charles G. Renold, managing director of Hans Renold, Ltd., of Manchester, analyzes the function of workshop committees, at the close of a very able paper, as follows:

> Gathering together the views and suggestions made in the foregoing pages; it is felt that three separate organizations within the works are necessary to represent the workers in the highly developed and elaborate organisms which modern factories tend to become.
>
> It is not sufficient criticism of such a proposal to say that it is too complicated. Modern industry is complicated and the attempt to introduce democratic ideas into its governance will necessarily make it more so. As already pointed out, the scheme need not be accepted in its entirety. For any trade or firm fortunate enough to operate under simpler conditions than those here assumed, only such of the suggestions need be accepted as suit its case.
>
> The scope of the three committees is shown as follows:
>
> 1. Shop stewards committee
> (a) Sphere. Controversial questions where interests of employer and worker are apparently opposed.
> (b) Constitution. Consists of trade unionist workers elected by works departments. Sits by itself, but has regular meetings with the management.
> (c) Examples of questions dealt with:
> Wage and piece rates.
> The carrying out of trade union agreements.
> Negotiations in re application of legislation to the workers represented.
> Introduction of new processes.
> Ventilation of grievances in re any of above.
> 2. Welfare committee
> (a) Sphere. "Community" questions, where there is no clash between interests of employer and worker.
> (b) Constitution. Composite committee of man-

agement and workers, with some direct representation of trade unions. Sits as one body, with some questions relegated to subcommittees, consisting either wholly of workers or of workers and management, according to the nature of the case.

(c) Examples of questions dealt with:

Shop rules.

Such working conditions as starting and stopping times, meal hours, night shift arrangements, etc.

Accident and sickness arrangement.

Shop comfort and hygiene.

Benevolent work, such as collection for charities, hard cases of illness or accident among the workers.

Education schemes:

Trade technique.

New works developments.

Statistics of works activity.

Business outlook.

Promotion—explanations and, if possible, consultation.

Ventilation of grievances, in re any of above.

3. Social union

(a) Sphere. Social amenities, mainly outside working hours.

(b) Constitution. Includes any or all grades of management and workers. Governing body elected by members irrespective of trade, grade, or sex.

(c) Examples of activities:

Institution of clubs for sports—cricket, football, swimming, etc.

Recreative societies—orchestral, choral, debating, etc.

Arranging social events—picnics, dances, etc.

Provision of games, library, etc., for use in meal hours.

Administration of club rooms.

The Cadbury Plan

The Cadbury shop committee and works council plan which has been in existence since 1919 has the following features of interest:

> The Works Council and Shop Committees are for the promotion and encouragement of good relations between employees and the management and are responsible for dealing with matters affecting the interests of all at Bourneville. The Council consists of 16 representatives, eight from the workers and eight from the management. There are Shop Committees in each department, mainly elected by the workers. These are classified according to work in eight groups, each appointing a member on the works council. All employees over 16 years of age are entitled to vote in the elections. Committee or Council Members must be 21 years of age or if under 21 have been employed five years.
>
> Committees of the Councils—for men and for women are:
>
> 1. Welfare and Recreation:
>   (a) Library Committee.
>   (b) Savings Fund and Thrift Committee.
>   (c) Catering Committee.
>   (d) Travel Committee (Holidays).
> 2. Health Committee:
>   (a) Benevolent Committee.
>   (b) Accidents Committee.
> 3. Rules and Discipline Committee. (Representative sits on the Tribunal which considers discipline cases.)
> 4. Suggestion Committee.
> 5. Wages Committee.
> 6. Finance and General Purpose Committee.
>
> The functions of the Council shall be to take such action as may be arranged between the Council and Board (of Directors) with regard to any of the matters mentioned above and to provide a channel through which any member of the Bourneville community may bring forward any matter or proposition intended to advance the well-being of all, and so promote harmony between the various sections of the Works.

The Council shall have executive action in matters delegated to them by the Board. With regard to other matters they shall either act through the Board or after obtaining the Board's consent.

In case of equal voting on the Council (upon which Management and employees are equally represented) the subject shall be postponed for one month, when the proposers shall have the option of again bringing the matter forward for consideration.[3]

Some Conclusions

The conclusions I reached from a study of the situation were that:

1. The Whitley works committees were a good thing in England because they permitted concerted and immediate action on local matters which would be almost impossible to handle through the ten or fifteen unions represented in each plant.

2. There was little or no idea of such committees "participating in management." When such questions had arisen the directors had vigorously expressed their intention to run their own business.

3. The chance of the Whitley committees being used to disrupt the unions was very remote as almost all committee members were strong union members.

4. Action of the committees was confined for the most part to local welfare matters, the more vital questions, such as wages and hours, being generally left for the unions and manufacturers' associations to fight out.

5. There were great variations in the type of organization in each case. Several of the largest and most powerful industries have refused to organize councils but the movement in general is growing and is constantly assuming more definite shape.

[3]For those who desire to examine such plans in detail, "Industrial Report No. 2 on Work Committees" is recommended.

Works Councils in Germany

In Chapter III we have already referred to the organization of the shop councils in connection with the Organized Economic System in Germany. During the war many regulations designed to protect working men were suspended. During the war, however, employees of large establishments demanded a voice in the drawing up of wage contracts. This demand started when the *Hilfs Dienst Gesetz*—the auxiliary service law—was created, which required all men under sixty to work in the interest of war production. To offset the workman's loss of freedom of labor contract, workmen's committees were granted certain rights and became mandatory in all industries. Their duty was to settle controversies between employers and employees. If they failed to bring about an agreement, then arbitration committees created for individual industries in different localities were to render the final decision. These committees were the forerunners of the later *Betriebsrate,* or works councils.

The *Betriebsrategesetz,* or Works Council Law, of February 4, 1920, provided for the replacement of the previous councils in all establishments of twenty workers or more. For smaller concerns *Betriebsobmanner,* or industrial arbiters, are chosen. These works councils have the deciding vote in all socio-political matters, especially those formulating regulations for the plants. They are given a voice in the matter of the discharge of workmen but not in the management of the plant. They are, however, given an insight into the management of the plant by the provision that "at the request of the industrial representatives, the heads of establishments that regularly employ 300 working men and 50 salaried employees, must furnish and explain a financial statement. This places the workmen legally in a position to support the management in order to bring about the highest efficiency and the greatest possible economy in the operation of the plant." The employer must

further give information in regard to all processes affecting the labor contract and the work of employees and must make a quarterly report on the standing and progress of the enterprise and of the industry in general. Furthermore, in enterprises having a board of directors, one or two members of the works council have the right to represent on the board the interests and demands of the workers and to present their views in regard to the problem of the organization of the plant.

When an agreement between the industrial representatives and the employers cannot be reached, an arbitration committee composed of an equal number of representatives of each, under the chairmanship of a disinterested party, makes decision. The works councils elect representatives to the *Reichwirtschaftsrat,* or National Economic Council (see Chapter III), which is a third house of parliament at least as powerful as the Reichstag, which was created by the decree of May 4, 1920, and which met for the first time on June 30, 1920.

The Law of 1920—Powers Granted

The law of February 4, 1920, granted the following powers to the workers' factory councils, in which all wage-earners and salaried employees are given representation in proportion to their numbers:

1. The management is to be supported by the factory council in all industrial operations, in order to secure the most efficient and economic conduct of the business.

2. The council is to co-operate in furthering the introduction of new methods in all productive processes.

3. The council shall secure the operation against disturbances arising from disputes among the workers, within the council itself, or between the workers and the employer. If such disputes cannot be settled by negotiation, the councils of wage-earners and salaried employees shall have the right to name an arbitration committee and set a time and place for adjustment.

4. The factory council shall see that the awards and adjustments of the arbitration committee are carried out.

5. The council shall have power to negotiate with the employer as to general labor regulations and changes in existing agreements.

6. It shall be the duty of the factory council to promote good feelings within the workers' unions as well as between them and the employer, and to work for the maintenance of the independence of the unions.

7. The council shall hear grievances of the workers and aid in their redress by joint negotiation with the employer.

8. The council shall co-operate in the administration of pension and housing funds as well as in other welfare projects of the industry. In the latter case, however, such co-operation shall not be effective where existing arrangements or rules operative in case of death shall interfere or cause a different representation.

Duties of the Councils

In addition, the wage-earners' and employees' councils, or, where they do not exist, the factory council, shall have the following duties:

1. To see to it that all legal orders favoring the workers, the standard wage agreements, and the awards of the recognized committees of arbitration are carried out.

2. Where a wage agreement does not exist, to co-operate with the industrial unions of the workers concerned in securing a regulation of wages and other conditions of labor; especially in the establishment of contract and piece-work rates and the principles governing such agreements; in the introduction of new wage methods; in the regulation of hours of labor, especially with reference to lengthening or shortening the standard work day; in the regulation of time off for the workers; and in the settlement of complaints concerning the training and treatment of apprentices.

3. To make agreements with the employer as to conditions of labor and other rules of employment for workers in the list of existing wage schedules according to the scale prescribed in section 80.

4. To investigate complaints and work for their adjustment in joint conference with the employer.

5. In case of disputes to summon the committee of adjustment or a court of arbitration, if the factory council refuses to hear the appeal.

6. To take cognizance of complaints of dangerous or unhealthful conditions in the industry; to support inspection officials and others concerned in such matters by advice and information; and in addition to work for the enforcement of police and safety regulations.

7. To take all possible care of those injured in war or by accident, and to secure for them occupations suitable to their strength and capabilities by mediation with the employer and their fellow-workers.

The reader should note especially the fact that these councils are formed primarily to *"secure the most efficient and economic conduct of the business"* not to *"fight* for the employees' rights."

These councils were in operation at the time of my visit. In one plant in Berlin employing 13,000 men, each 500 employees chose a representative. The 27 representatives thus named chose a council of 5 who treated with the management. It was reported that the councils were generally functioning satisfactorily. The reports which I have since had from Germany indicate that all is working as desired.

Growth of Trade Unionism

Parallel with the growth of works councils has been the growth of trade unionism. The International Labor Office at Geneva reported in February, 1921, a growth of from 10,835,000 trade unionists in 20 countries in 1910, to 32,680,000 in 1919. Trade union members in the United States during that period have increased from 2,100,000 to 5,607,000; Great Britain from 2,400,000 to 8,024,000; Germany from 2,960,000 to 9,000,000; France from 977,000 to 2,500,000; and Italy

from 817,000 to 1,800,000. This means that the number of trade unionists more than doubled in every country during the war.

In spite of recent reaction, the human element has assumed since the war started, an importance and a power in industry unprecedented in any period of history. The progression was made inevitable by dispensation of the popular franchise. Real participation in management waits on education. Whether or not control of management will pass into the hands of the employees will depend upon the development of fitness for administration among the rank and file.

CHAPTER XVIII

CONCLUSION

The Industrial Administrator and the Future

There was a time when, even in America, the business man was looked down upon as one who knew only one thing—who lacked broad interests and who, therefore, was not quite fit to associate with those of "real culture." The business man of today knows more about what is really happening throughout the world than anyone else. Civilization has now become so thoroughly impregnated with industrialism that there is hardly anyone left who is not in some way—as stockholder, banker, executive, or employee—dependent upon or engaged in industry.

The present-day administrator, the man who, from a study of the facts—economic, sociological, and financial—shapes the policy upon which the success of each enterprise depends, must be able to predict the future. What else is the budget and the financial forecast but a prophecy of future expenditure and the probable need for capital? What makes a man able to predict successfully often enough to conduct his business profitably? Knowledge of the laws to which mankind reacts, knowledge of the reaction of races to certain stimuli, and knowledge of world economics, as well as that special detailed knowledge necessary to the conduct of his own business.

It has seemed worth while then at the end of a year spent in the study of management methods in Europe and in comparing conditions there with those which exist in America, to attempt to sum it all up and to secure a glimpse of the future from a study of what has gone before. Whether he deserves

it or not the future is largely in the hands of the industrialist. His leaders are those who consider conditions which exist, who interpret them in the light of real experience with human nature, and who throw their influence to the upbuilding of humanity. The industrial administrator—if he be worthy of his trust—is of this type.

Warfare and Human Development

What then does it all signify? What has come to industry and to our industrial civilization as the result of the war? And what will be the outcome? These questions are not so difficult to answer from the standpoint of the changes in and the development of specific industrial methods and principles as from the standpoint of human development. For centuries history has been a repetition of the tragedy of the forgotten lesson. What generations and what nations have learned by bitter experience has been lost—blown to the four winds of heaven with the ashes of Caesar and of Tyre.

What mankind—the mothers and the fathers of the heroic dead, the owners of the wrecked villages and the devastated workshops, the outraged girls and the ruined boys—has learned from the Great War has been learned by every second generation since the dawn of history. But there is this difference: In former centuries the horrors of war were passed from generation to generation by word of mouth. Nature mercifully so constructs us that we remember the joys and forget the sorrows of life. Tales of war, of destruction, and of death were, until the middle of the last century, softened in the telling by old men recalling the strength of their youth before a village hearthstone on a long winter evening. Now for the first time in the life of the human race general education and the dissemination of the printed word—photography—and the true word picture, boldly painted by the press, have placed the common people in possession of the facts about

war. Much that has been written is already forgotten—but mankind has had its first chance since history dawned to remember and to profit by its lesson.

Industrial Effects of the War

Industrially the outstanding results of the war may be summarized as follows:

1. The pooling of knowledge of processes, methods, and principles of management.
2. The enormous increase in the size of industrial units.
3. The growth of the idea of the responsibility of management to the public.
4. The recognition of the right of workmen to participate in the control of industry.
5. The realization upon the part of labor that authority carries with it responsibility—that labor is not the only factor in industry.

These five developments naturally occur together. As those in control of various plants were forced by the enemy to share their knowledge with each other, the value of association became evident. When industrial units became so large that a large section of the public in a community, each with the right to vote, were employees of a single firm, it became unsafe to treat employees other than as a public to be pleased. The natural outgrowth of this was to enlist the co-operation of the public by asking their advice and by endeavoring to follow a managerial policy which would stand the light of public opinion.

With this growth of industry out of the condition in which the owner could keep in personal touch with each of his employees, new administrative and executive control methods necessarily developed. What Franklin could do personally Henry Ford must do through a department of personnel, a

statistical and accounting department, through industrial and technical engineers, works managers, sales managers, and financial managers—all equipped with mechanisms and tools to extend and multiply the activities of the brain and hand of the master mind ten thousand fold. Today policies must be more accurately determined. Franklin could try one policy in his shop in the morning and if the afternoon's work proved it unwise, he could alter it with comparatively little trouble or loss. Today the word that affects 100,000 families, decides upon the erection of a $1,000,000 factory, or alters a sales policy in an organization reaching half across the world, must be carefully weighed before it is uttered.

The industrial leader's responsibility toward the community has increased as larger sections of it have come under the control of the individual. The dream of service to mankind has drawn the young man who formerly went into the ministry into industrial relations work. The university professor has turned his attention from the humanities to the betterment of industrial conditions. As the scientific method has been applied to industrial problems, the rule-of-thumb methods of the groping pioneer and the "isms" of the inexperienced with an ideal have given way. Science, ideals, and experience have merged and have produced a true science of managment—a science which fulfils Huxley's definition of "organized common sense."

The next step is the education of the stockholder to support the new type of administrator—to forego immediate dividends for future stability, to realize his personal responsibility, to be satisfied with moderate earnings for the sake of public confidence, to insist upon knowledge of the means by which dividends are produced and satisfaction as to their being earned by methods which will continue to result in public confidence, rather than to insist merely upon their frequency and size. Industrial stocks are still considered risky and must show

large earnings in order to find buyers. When industry has been stabilized, methods of management which are now necessary to produce dividends sufficient to attract capital will not be needed, and another vicious circle will be destroyed. Industrial management has already become a profession. As knowledge continues to accumulate and to be disseminated, the constituency of each industrial administrator will insist upon a training no less thorough, a competence no less complete, a code of ethics no less high than do those individuals who trust their fortunes and their lives to the lawyer and to the physician.

The plague of social and political disorder which followed the war—the industrial and social collapse of Russia, Italy's mild attack of Bolshevism and the touch of the fever which was felt by England, Germany, France, and America—taught all parties to industry a lesson. This lesson can almost be reduced to a formula:

When *X*, which consists of:
A—or the Inertia and Dislike of change inherent in human nature
and of:
B—or the fear of consequence of revolt, as:
a—Death and injury
b—Loss of property
c—Starvation and privation
is outweighed by *Y*, which consists of:
M—or real injustice to the masses—whether it comes from capital, government, or act of nature
and of:
N—or belief that injustice is the work of a definite group which can be defeated
and of:
O—Excitation by:
a—Inspired leaders of human progress
b—Inexperienced uplifters
c—Demagogues with an axe to grind

the existing organization is overturned regardless of consequences. The formula then is:

$X > Y$ = Industrial and Social Peace
$X < Y$ = Industrial and Social Revolution

The responsibility of each class then is evident. The lesson is there. All classes must read it aright if twentieth century civilization is to endure.

Education vs. Powers of Destruction

Since the war closed immense strides toward world industrial consolidation have been made. Immense strides have been made in the dissemination of knowledge as to principles and methods of administration. Knowledge of industrial processes and mechanisms have spread throughout the world. The race is now between education—the education of stockholders, of managers, and of employees to the principles and to the ideals which have survived the trial by fire—and the powers of destruction. Will the passions of man, inflamed by selfishness and greed and by appeals to his lower nature, burst forth in anger and destroy all that industry has wrought, or will the knowledge brought forth in bitterness and sorrow reach the uttermost ends of industrial civilization quickly enough and forcibly enough to enable man's better nature, fortified with a knowledge of what is worth striving for and of the value of service, to save itself from destruction? The responsibility rests with each of us individually. Are we willing to learn and willing to teach? Are we each setting our own house in order? The survival of civilization hangs in the balance, and the leaders of industry—the men who are shaping the policies of our great corporations—must point the way.

APPENDIX A

DEFINITIONS OF BRITISH LABOR TERMS[1]

From the "British Employers' Year Book"

In America party and labor terms are very loosely used. To clarify the text and to illustrate the viewpoint of the employer in England it has seemed wise to quote certain definitions from the "British Employers' Year Book"—which gives nineteen 8 x 10 pages of such definitions.

Anarchism. An Anarchist in theory is one who recognizes no law except the law of nature; he is without ties of Church, of family, of State, or of nation; and takes no part in the formation of a common conscience or general will.

Black-Coat Labour. The people who work for the political aims of the Labour Party, but who are not of the class usually described as Labour.

Blackleg. A trade-unionist who continues at work after a strike is started; also a non-unionist who takes the place of a striker.

Bolshevism. The policy of the extremist section of the Socialist parties of Russia. The policy is destruction of capital and landlordism, effected by the killing of capitalists and the more highly educated people generally; the nationalisation of all industry; the coercion of labour to prevent starvation; the prohibition of trade-unionism; the stoppage of freedom of the Press; and the prompt execution of anyone suspected of being anti-Bolshevist.

B. S. P. British Socialist Party. Successors to the Social Democratic Federation and made up largely of othodox followers of Karl Marx.

Bureaucracy. A Government run by departments, each under a chief.

Ca' Canny. To go slow; to waste time; and to reduce output of work deliberately.

[1]The matter here given refers to Chapter IV.

Capitalism. The existing social system, based on the rights of private ownership of land and property, common to all civilised countries hitherto.

Collectivism. The policy of State management of land and industry, as opposed to *Individualism,* or private freedom and open competition. Nationalisation is Collectivism.

Communism. Common control and ownership of everything; which when established is a result in "the ordered demand and supply of all those things essential to a happy human existence; all would have a new life with leisure, wealth, and freedom." There are two Communist organisations—the "Communist League," and the "Communist Party"; the latter was formerly the "Workers' Socialist Federation." Both groups "repudiate parliamentary and municipal action and believe in the Soviet form of administration, and the dictatorship of the proletariat."

Compagnons de l'Intelligence. Comrades of the brain workers; a French union of the middle classes to resist tyranny of either Labour or Capital.

Craft-Union. A trade-union based on actual craft, for instance, Boilermakers, as distinct from *Industry-union* based on a whole industry, like National Union of Railwaymen.

Democracy. Any form of Government of a country which is under the ultimate control of the people as a whole, the people being the sovereign authority. The method of making that authority effective is usually by some system of voting to establish the will of the majority of the people, for a nation is hardly ever of one mind, and on many questions great numbers of the citizens have no opinion at all, and it is formed for them. (See "Oligarchy.")

Dilution. The use of non-unionists in a trade-unionist occupation.

Fabian Society. A Socialist body formed in 1884 under Mr. Sidney Webb and other middle-class followers of Karl Marx, who yet are not able to accept Marx's claim that manual labour produces all wealth, and should, therefore, own it all. They believe in brainwork being credited also; but that the State should control and direct all industry, and supply all the people with the means for a comfortable life; to which ends Capitalism must be destroyed. Their aims, as expressed in the prospectus of the Society, are "the organisation of Society by the emancipation of land and industrial capital from individual and class ownership,

and the vesting of them in the community for the general benefit." Their membership in 1913 was 2,800; in 1919, it was 2,140, including many women. The Fabians want the change made gradually, constitutionally, and with all kindness possible; the real Marxian Socialists know it needs red-revolution, which has grown greatly in popularity of late years. The members have exercised wide influence through the I. L. P. and trade-unions, on the Labour Party generally.

Guild-Socialism. A variety of Socialism which consists in organising Labour into great industrial unions, or National Guilds; which (after destruction of Capitalism) will assume control of the various industries, and then combine by a Central Guild Congress, which will co-operate with the State, which is to occupy itself with internal and external order. To effect this, an absolute necessity is "the abolition of Capitalism and the wage system." The constructors of Guild-Socialism were mostly Fabians originally.

I. L. P. Independent Labour Party. Formed in 1893 by a number of Socialists, like Keir Hardie, with intention of getting influence in trade-unions, and nominating Socialists for Parliamentary elections. The general object is "to establish the Socialist State when land and capital will be held by the community."

Intellectuals. Generally used to describe middle-class people who co-operate with Labour or with revolutionary associations in movements for destroying existing social and industrial systems.

Jacobin. A member of the Jacobin Club of Paris in the early days of the French Revolution; and since applied both in France and England to theoretical advocates of revolution; described by Burke in the words, "This sort of people are so taken up with their theories of the rights of man, that they have totally forgot his nature."

Labour Party. Applied generally to the body directing political efforts of Labour. It was originally "a federation consisting of Trade-Unions, the I. L. P., the Fabian Society, and a large number of Trades Councils, and local Labour parties." The trade-unions supply the bulk of the membership, and of the funds; but the active Socialists determine the policy. It has supplied a number of notably good and useful members of Parliament; but a good record in Parliament has usually aroused opposition on the part of the real controlling power of the Socialist minority of the

Party. The ultimate source of power of the Labour Party depends on the votes of the members of trade-unions; but the great majority of those members are silent; and their votes when they trouble to give them are manipulated by the active organisers of policy.

NATIONALISATION. Taking a business, or an industry, or a property, from private ownership into Government control; substituting Collectivism for Individualism.

N. D. L. P. NATIONAL DEMOCRATIC AND LABOUR PARTY (British Workers' League). A party with a patriotic and constitutional policy for Labour and all other classes; advocating individual freedom and unrestricted production; opposing the tyranny of trade-unions when their leaders propose Socialistic aims; defending national security and Empire unity. The party's nominees at the last General Election defeated several well-known members of the I. L. P., including Macdonald, Outhwaite, Henderson, Jowett, Robertson.

N. S. P. NATIONAL SOCIALIST PARTY. Formed chiefly by those patriotic members of the British Socialist Party who were supporters of their country in the war.

OLIGARCHY. Government by a few. Whether in the actual Government of the country, or in the formation and directing of opinion among the people as a mass, the influence of the few over the many is always most powerful.

PLEBS LEAGUE. The propagandist section of the Central Labour College in the teaching of Socialism and class-war throughout the country.

SABOTAGE. Destruction of property; spoiling or destroying work secretly.

SHOP STEWARDS. The establishment of these is part of the Rank-and-File Movement, which came into public notice early in 1916, and was worked chiefly by the I. L. P., assisted by all the revolutionaries in the country. It was a movement to destroy the authority of the old trade-union leaders; to undermine discipline; to work on the wilder members of the unions; and to start strikes locally all over the country and then force the Government into concession after concession so as to secure the domination of labour.

S. L. P. SOCIALIST LABOUR PARTY. One of the three Socialist parties. Membership is based on the belief that a class-war is the first

essential of reform. It is devoted to the worship of Karl Marx.

SOCIALISM. A term used for many differing policies. In essence it means getting rid of Capitalists and Landlords. Socialists differ widely as to how it is to be done, and as to what will follow when it is done. Some propose gradual and constitutional action by taxing capitalists and landlords out of existence; others favour a policy of bloodshed. Then there is complete disagreement among Socialists about the policy of the changed world, and whether the land and the capital shall belong to one central Government, the State, acting for all; or whether it shall be divided between trade groups or Guilds; or whether everyone is to help himself to what he can lay hands on.

S. P. G. B. SOCIALIST PARTY OF GREAT BRITAIN, who wage war on all who differ, whether Labour or Capital, and follow Marx.

STRIKES. As defined by the Industrial Worker, organ of the I. W. W., consist of:

The Stay-in Strike—folding the arms while on the job.
The Irritation Strike—continuously coming out and going back.
The Lightning Strike—stopping without notice.
The Opportune Strike—stopping when very urgent orders are in hand.
The final Universal Strike—seizing the factories and locking out the employers.

TRADE-UNIONS. Associations formed among members of the same trade for promotion of their mutual interests and protection of their rights. They were illegal in England, the home of trade-unionism up to 1824, although some 47 of them existed; and their powers were limited up to 1871. In 1885 the Socialist influence became important, and after 1893 the I. L. P. greatly increased this influence, and in 1900 the Labour Party was established to secure a Labour group in Parliament, with members paid mostly from trade-union funds, and pledged to abstain from joining any section of the Conservative or Liberal parties. The I. L. P. and Socialist influences have been increasingly evident in the Labour Party. Only a few of the trade-unions appear actively in political matters. The number of trade-unions at the end of 1918 was 1,220, with a total membership of 6,624,000, of whom 1,220,000 were women. A very large increase occurred during the war.

A number of trade-unions are now so directed in policy that they oppose all payment by results, bonus systems, or profit-

sharing, and, incidentally, many schemes making for harmony between employers and employed. Their real aims are now political, and directed to a complete change of the industrial system.

TRIPLE ALLIANCE. A working arrangement, or combination, for certain purposes, between the leaders of three of the big trade-unions —the Miners, Railwaymen, and Transport Workers—to bring pressure on the Government and public by a strike, or threat of a strike, which would paralyse all industry and food distribution.

VICTIMISATION. The punishment in any way, after a strike, of a worker or a firm for actions during a strike.

WHITLEY COMMITTEES—WORKS COMMITTEES. Committees formed in works of representatives of both employers and employed, for the purpose of mutual understanding, harmonious working, and securing the best efficiency.

APPENDIX B

THE TRAINING OF WORKERS—A BRIEF REFERENCE LIST[1]

The writer realizes that the list here given is by no means complete, and that the titles of many valuable works have unquestionably been omitted. What is here given is virtually his own working list. The titles are set down in the hope that they may perhaps prove useful to other persons.

Allgemeinen Elektricitäts Gesellschaft, Berlin, Ausbildung Gewerblicher Lehrlung Lehr Plan. Psychotechnische Eignungsprufung. Werkschuleder Fabriken, Brunnenstrasse.

Die Berufseignungs Prufung Unserer Lehrlinge, Berlin, Ludwig Loewe und Kompanie.

Continued Education Under the New Education Act. The Labour Party, 33 Eccleston Square, London, S. W. I.

Engineering Progress. October, 1920. Berlin, Auslandverlag, G. M. B. H., Berlin, S. W. 19.

Ferguson, R. W. Evolution of a Day Continuation School Scheme. Bournemouth, England, Education Committee, Cadbury Brothers, Ltd.

Fleming, A. P. M., and Pearce, J. G. The New Management. London, "Business Organization and Management," October-December, 1920, January, 1921.

Geddes, Auckland. Recent Changes in British Education. Washington, *School Life,* June 15, 1920, pp. 5-7.

Address delivered at the National Citizens' Conference on Education called by the Commissioner of Education, Washington, D. C., May 21, 1920.

Godfrey, Hollis. Co-operation Between Industry and the Colleges. New York, *Educational Review,* June 1920, pp. 42-51.

Great Britain. Education Act of 1918. London, H. M. Stationery Office.

[1]This appendix refers to Chapter XVI.

Halsey, G. D. Outline Course of Twelve Meetings for Foremen, Chicago, *Personnel,* January 1921, pp. 1-5. Published by the Industrial Relations Association of America

Hickey, T. P. Linking Education with Factory Profits. Chicago, *Factory,* November 1920.

Industrial Relations Association of America. Transactions 1919 to date. East Orange, N. J., 564 Main St.; formerly National Association of Employment Managers.

Leverhulme, W. H. Lever, 1st Baron. Standardization Welfare, an address to the students of Sheffield University. Port Sunlight, England, Lever Brothers.

Mensforth, H. Some Phases of Works Management. Proceedings of the Manchester Association of Engineers, Manchester, England.

Moede, Dr. Psychotechnical Tests. The author, University of Charlottenberg, Berlin, Germany.

National Association of Corporation Training. Proceedings, 1913 to date. New York, 130 East 15th Street.

Society of Industrial Engineers. Industrial Education. Complete report of the proceedings of the fall national convention, Pittsburgh, November 10-12, 1920. Chicago, 1921. 245 pp. (Publications Vol. 4, No. 1.)

Terman, L. M. Condensed Guide for the Stanford Revision of the Binet-Simon Intelligence Tests. Boston, Houghton, Mifflin Company, 1920. 32 pp.

United States. Department of Labor, Training Service. British Methods of Training Workers in War Industries. Washington, 1918. 68 pp. (Bulletin upon Training and Dilution No. 3.)

United States. Federal Board for Vocational Education. Job Specification. Washington, 1919. 64 pp. (Bulletin No. 45.)

Unsere LehrlingsAusbildung. Berlin, Ludwig Loewe und Kompanie.

Yoakum, C. S., and Yerkes, R. M., editors. Army Mental Tests. New York, Henry Holt and Company, 1920. 303 pp.

The National Institute of Psychology and Physiology applied to Commerce and Industry (George H. Miles, D. Sc., Secretary, 329 High Holburn, London, W. C. 2, England) gives, in some of its literature, some exceedingly interesting results of—

1. The elimination of unnecessary movements and other labour-saving methods.

2. The effects of fatigue on output.
3. The personal qualities required for success in different occupations.

As a bibliography the Institute lists—

Drury, H. B. Scientific Management. New York, Longmans, Green and Co., 1918.

Gantt, H. L. Industrial Leadership. Yale University Press, 1916.

Gantt, H. L. Work, Wages, and Profits. New York, Engineering Magazine Company, 1913.

Gilbreth, F. B. and L. M. Fatigue Study. New York, Sturgis and Walton, 1916.

Gilbreth, F. B., and L. M. Motion Study. Montclair, N. J., The authors, 1916.

McKillop, M., and A. D. Efficiency Methods. London, Routledge and Sons, 1917.

Muscio, B. Lectures on Industrial Psychology. London, Routledge and Sons, 1914.

Particularly good literature introducing the new employee to the plant is published by the Westinghouse Company at East Pittsburgh, Pennsylvania; by the Cincinnati Planer Company at Cincinnati, Ohio; by the Larkin Company of Buffalo, New York; by the Printz-Biederman Company of Cleveland, Ohio; by the Miller Lock Company of Philadelphia, Pennsylvania; by Morland and Impey, Northfield, Birmingham, England; by Cadbury Brothers, Bourneville, England.

APPENDIX C

PROSPECTUS OF AN ENGLISH DAY CONTINUATION SCHOOL[1]

Session 1919-1920

Object of the School

The Blank Company Day Continuation School is intended to provide a sound, practical, continuation education along lines required by the Education Act of 1918, for all the junior employees of the Firm.

In the Boys' Department a three-year course is planned for all boys between the ages of 14 and 17 years. In the Girls' Department two distinct types of classes are provided, a two-year general course, and a two-year commercial course, for all the girls between the ages of 14 and 16 years.

Control of the School

The School premises situated at the No. 1. Works consist of classrooms, a science laboratory, gymnasium, and boys' and girls' common rooms. These are provided by the Firm together with all permanent equipment. The Manchester Education Committee are responsible for the educational conduct and efficiency of the School, including the supply of staff and arrangement of the curriculum. All material other than that of a permanent character is provided by the Manchester Education Committee, as in the case of other schools under their control.

Subjects of Instruction

Boys' Department

The technical courses are planned with a view to enabling the boys to take up a further technical education in the technical institutions of Manchester and district.

Practical Mathematics—including Arithmetic, Algebra, Mensuration, Trigonometry, etc., all treated practically and illustrated from workshop problems and calculations.

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[1]The matter in this appendix refers to Chapter XVI.

Engineering Drawing—including Construction and Geometry as well as Handsketching and Practical Machine Drawing.

Workshop Practice—a practical course of Woodwork co-ordinated with the Mathematics and Science of the School. Lessons on the care of tools, sharpening tools, growth and uses of timber are given.

English—a course of study designed to widen the pupils' horizon, train him in self-expression and encourage in him a love of reading. History, Geography, and Duties of Citizenship are all included.

A well-stocked *School Library* is instituted for the boys' use and, in addition, full use is made of the magnificent Technical Library of the Firm.

Engineering Science—This course consists of lectures and practical work in Physics, Mechanics, and a study of Heat as applied to Heat Engines.

Physical Exercises and Games—Lessons will be given by a trained instructor in a specially equipped room. The lessons include games and various exercises, all being, besides a relaxation of the brain, a training in the control of the muscles and nerves by the will.

In suitable weather, outdoor games are played on the Playing Fields adjoining the works.

Girls' Department—General Courses

Arithmetic—including household bills, short methods of calculating, general mensuration from a consideration of problems met with in household affairs.

English—including English Language and Literature, letter-writing, etc.

In order that the students may study books of travel with intelligence and interest and also to broaden their outlook on life, the *School Library* will be used extensively and occasionally English lessons will be devoted to the study of the broad physical and geographical facts which control the activities of mankind.

Needlework—This course aims at teaching the girls to make and repair their own clothing and domestic articles and cultivating their taste for harmonious colourings.

Girls' Department—Commercial Courses.

Arithmetic and Accounts—Including decimals, mensuration, methods of decimalisation of money and weights and measures, graphs. Closely related to this course will be a study of Accounts and Accounting methods.

English—The English will be taken along similar lines to the English of the General Courses. Commercial letters will be written and the English will have a bias towards commercial requirements.

Shorthand—Pitman's System will be taught.

Tutorial Classes for Girls—These classes will be devoted to the development of the natural bent or inclination of each student. The students will select their own subject of study and careful guidance will be given by a teacher who will be in attendance and control each class. The students will be encouraged to develop their self-reliance, originality, and ingenuity.

Physical Exercise—The physical exercises will consist of free exercises and organized games, both indoor and outdoor, including team games.

Social Life of the School

The Pupils are encouraged to govern themselves through the various School activities. Boys' and Girls' common rooms have been opened, where various indoor games are played. The control of these common rooms is in the hands of the Continuation School Council, a body elected by the students themselves.

The School is a self-governed community and many valuable lessons are learned by the students in the practice of good comradeship in the school.

The help of the Blank Company Social Union is enlisted in the providing of tackle for the various activities and the boys are encouraged to join the Athletic Clubs (Football, Swimming, Cricket, etc.) of the Social Union.

Homework

Home lessons are a necessity if a student is to make full use of the instruction given in the School Course, and homework forms a regular part of the School programs. Their success depends largely upon the influence of the home and in this matter the co-operation of the students' parents is earnestly invited.

School Reports and Scholarships

Reports on attendance, conduct, ability, etc., will be issued each term. Two Scholarships will be awarded at the close of the School Year, providing free tuition in the Day Continuation Classes at the College of Technology, Manchester.

Special Classes

Commercial courses are institutes for girls over 16 years of age employed in the clerical and accounts' departments. The subjects of instruction include Business Arithmetic and Accounts, Shorthand, English Correspondence, English Literature, and the Theory and Practice of Commerce.

Evening Classes

Evening classes for men are held on the school premises. The subjects of instruction for these classes are Mathematics and Mechanics. The classes and curriculum are arranged to meet the requirements in Mathematics and Mechanics of the various types of work done in the departments.

Boys' Woodwork Class—A class for boys who have passed through the 1st and 2nd year Woodwork courses in the Day School is held in the evening.

The boys are encouraged to invent their own models and after producing the necessary drawings and specifying the amount of material and operations necessary, construct the model under the supervision of the teacher.

APPENDIX D

SHOP GOVERNMENT AND PROFIT-SHARING—ENGLISH AND GERMAN WORKS[1]

Complete and detailed consideration of the subjects of shop government and profit-sharing would require at least two volumes of this size. For the benefit of those who wish to go more fully into these subjects the following sources of information are suggested:

PART I—PROFIT-SHARING

Bayfield, A. F. Lehigh Valley Plan for Selling Stock to Employees. New York, *Railway Age,* November 19, 1920, and Chicago, *Manufacturers' News,* January 6, 1921.

Burritt, A. W., and others. Profit-Sharing; Its Principles and Practice. New York, Harper and Brothers, 1918. 328 pp.

This is probably the most complete and comprehensive work on profit-sharing.

Great Britain, Commercial Labour and Statistical Department. Profit-Sharing and Co-partnership Abroad. London, H. M. Stationery Office, 1914. 164 pp.

Great Britain, Ministry of Labour Intelligence and Statistics Department. Profit-Sharing and Labour Co-partnership. London, H. M. Stationery Office, 1920. 244 pp.

Lever Brothers Ltd. Port Sunlight, England. "Co-partnership" in "Standardizing Welfare."

National Association of Corporation Training. Committee on Profit-Sharing and Allied Thrift Plans. Report. (In Eighth Annual Proceedings, New York, 1920, pp. 469-536.)

National Civic Federation. Profit-Sharing by American Employees; Examples from England, Types in France. New York, National Civic Federation, 1920. 423 pp.

[1]The matter in this appendix refers to Chapter XVII.

United States. Bureau of Labor Statistics. Profit-Sharing in the United States. Washington, 1917. 188 pp. (Bulletin 208.)

Part II—Shop Government

American Academy of Political and Social Science. Industrial Stability. Philadelphia, 1920. 177 pp.

American Academy of Political and Social Science. Social and Industrial Conditions in the Germany of Today. Philadelphia, 1920. 166 pp.

American Multigraph Company. Multigraph Industrial Democracy. Cleveland, Ohio.

Bagley, B. D. Timely Survey of Shop Committee Plans. Rochester, N. Y., Underwriters of Rochester, 1920.

Betriebsratgesetz; Textausgabe. Berlin, Carl Heymanns Verlag, 1920.

Cadbury Brothers. Bourneville Workshop Committee and Works Council. Bourneville, England, 1919.

Carpenter, O. F. Shop Committee That Failed. New York, *Industrial Management,* January 1, 1921, pp. 59-62.

Carpenter, O. F. Two Years of Industrial Legislation in a Large Clothing Factory. Washington, *Monthly Labor Review,* August, 1920, pp. 234-245.

Collins, J. H. Bear Times and the Employee Stockholder. Philadelphia, *Saturday Evening Post,* May 21, 1921, pp. 12-13.

Cowdrick, E. S. Successful Trial of Industrial Representation Plan; The Colorado Fuel and Iron Company. New York, *Industrial Management,* February 1, 1920, pp. 123-125.

Garton Foundation. Industrial Council for the Building Industry. London, Harrison and Sons, 1919. 153 pp.

Gee, Philip, Editor. Employers' Year Book. London, 246 Temple Chambers, 1920. 412 pp.

Partial contents: Conciliation in Trade Disputes, by Lord Askwith; Whitley Councils, by J. H. Whitley; Bridging the Gulf, by J. D. Stevens; Co-partnership and Profit-Sharing, by Lord Robert Cecil; Premium Bonus System, by Douglas Vickers and others.

German Works Council Law. Washington, *Monthly Labor Review,* May, 1920, pp. 172-181.

Goodyear Tire and Rubber Company. Industrial Representation Plan. Akron, Ohio, 1919. 84 pp.

Great Britain. Civil Service, National Whitley Council. Report of the Cost of Living Committee appointed by the Civil Service National Whitley Council. London, H. M. Stationery Office, 1921. 5 pp.

Great Britain, Ministry of Labour. Industrial Councils. The Whitley Report. London, H. M. Stationery Office, 1917. (Industrial Report No. 1.)

Great Britain. Ministry of Labour. Industrial Councils and Trade Boards. London, H. M. Stationery Office, 1918. (Industrial Report No. 3.)

Great Britain. Ministry of Labour. Work Committees. London, H. M. Stationery Office, 1918. (Industrial Report No. 2.)

Howard, E. D. The Hart, Schaffner and Marx Labor Agreement; Industrial Law in the Clothing Industry. New ed. Chicago, Hart, Schaffner and Marx, 1920. 97 pp.

Industrial Relations Association of America. Proceedings of Convention Held at Cleveland, May 21-23, 1919. East Orange, N. J., 564 Main St. Formerly the National Association of Employment Managers.

Jacobstein, Meyer. Can Industrial Democracy Be Efficient? New York, Bulletin of the Taylor Society, August 1920, pp. 153-159. Abstracted in *Monthly Labor Review.* December 1920, pp. 1218-1219.

Jones, E. D., compiler. Bibliography of Employment Management. Washington, Federal Board for Vocational Education, June, 1920. 119 pp. (Bulletin No. 51. Employment Management Series, No. 9.)

Kiesche and Syrup. Kommentar zum Betriebsratgesetz. Berlin, Carl Heymanns Verlag.

Lee, J. Industrial Control. In his Management; a Study of Industrial Organization. London, Sir Isaac Pitman and Sons, 1921. 25 pp.

Leitch, John. Man to Man; the Story of Industrial Democracy. New York, B. C. Forbes Company, 1919. 249 pp.

Meeker, Royal. Employees' Representation in Management of Industry. Washington, *Monthly Labor Review,* February 1920, pp. 305-318.

The Pennsylvania Plan; Details of the Agreement Between the Management and the Employees of the Pennsylvania Railroad

System. New York, *Industrial Management,* February 1, 1921, pp. 147-148.

Piez, Charles. The Baneful Influence of Adjustment Boards. Chicago, *Manufacturers' News,* January 20, 1921.

Renold, Hans, Ltd. Workshop Committees—Suggested Lines of Development. Hans Renold, Ltd., Manchester, England, 1917.

Resolved: That the Workers Should Participate in Management. Debate before the New York Chapter of the Society of Industrial Engineers. Affirmative—W. M. Leiserson and John Leitch. Negative—Harrington Emerson and Harry Franklin Porter. Chicago, *Business Crucible,* March-April 1921.

Self-Government in the Building Industry in Great Britain. Washington, *Monthly Labor Review,* October 1920, pp. 792-797.

Stoddard, W. L. Trade Unionism versus Shop Committees. New York, *Industrial Management,* April 1, 1921, p. 310.

Stove, Hermann. Gesetz Über Betriebsräte. Berlin, Carl Heymanns Verlag.

Wallace, W. History of Profit-Sharing in the British Isles. New York, *Industrial Management,* February 1, 1921, pp. 85-89.

Wolfe, A. B. Works Committees and Joint Industrial Councils. United States Shipping Board Emergency Fleet Corporation, Industrial Relations Division, Philadelphia, January 1919. 254 pp.

Worth, W. E. The International Harvester Company Plan. Chicago, *Brick and Clay Record,* January 11, 1921, pp. 27-29.

Youngstown Sheet and Tube Company. Representation of Employees. Youngstown, Ohio, 1918.

APPENDIX E

AN EXPERIENCE WITH PROFIT-SHARING[1]

The profit-sharing scheme referred to in Chapter XVII consisted of a legal contract between the company, which was capitalized at several millions, and the employee, designed "to give the employee a greater interest in the company and a share in the profits in order to induce continuous, intelligent, and faithful services to the company, and to provide for increasing emoluments to the employee so long as he gives his entire time, energies, and fidelity to the welfare of the company." The employee agreed to remain in the employ of the company for a period of five years at the salary received at the time the contract was signed; in return for which he was allowed to subscribe to stock whose par value amounted to three times his annual salary and agreed to pay for it according to a rather elaborate plan whose main features were as follows: Interest at the rate of 4 per cent was charged the employee on the par value of the stock. In return he was credited with all cash dividends declared. New stock dividends were not credited in the same way as cash dividends, but were held until the original stock became the property of the employee. In addition to cash dividends, the employee's account was credited with a "bonus" consisting of 2 per cent of the par value of his stock the first year and increasing ½ per cent each subsequent year under the contract. Further, the employee was required to subscribe 10 per cent of his salary in payment for his stock.

Altogether, the contract covered five pages of legal cap paper, and there were three pages additional of explanations of terms, etc. Provision was made for the termination of the contract under various eventualities—in case of resignation, discharge, disability, and death.

The plan had been worked out very carefully by the officers of the company, after an examination of numerous profit-sharing schemes. They were very enthusiastic about it and were, without doubt, sincere in their belief that it would be of mutual benefit to the employees and to the company. Those who should be allowed to participate were selected with great care and with due regard to their potential value

[1]The matter in this appendix refers to Chapter XVII.

to the company. These included executive officers below the grade of general manager, superintendents, assistant superintendents and foremen, the general sales manager and various salesmen, the company's auditor, and several of the more important members of the general office force.

In introducing the plan the company struck a snag immediately in the provisions against salary raises. Every employee of any ambition at all has dreams of the boss calling him in and with one hand on his shoulder—as depicted in the correspondence school advertisements in the magazines—saying: "Young man you have shown your worth. The firm wishes to recognize your ability. Your salary is therefore raised to"—whatever the youngster's wildest dream of avarice happens to be at the time. The proposed destruction of this picture at one fell stroke of the pen took all the joy out of life. As a result, objections which were voiced gave rise to an explanation that "of course, in case of promotion the salary would be raised." This satisfied such men as had reasonable prospects of advancing as the business grew, but the fact remained that in the majority of cases there was a feeling that a right had been signed away—that hope had received a dastardly blow in the back, and that something had been subtracted from the joy of existence.

The legal phraseology bothered a number—probably not over fifty per cent of the participating employees understood exactly what it did mean, but took the contract on faith because they trusted the officials of the company personally. Certainly not over 25 per cent understood clearly how the transfer of earnings to capital account rather than their distribution as dividends, thereby transferring ownership of the stock so much sooner, benefited them personally. Others objected to the subtraction of 10 per cent from their incomes. One man said frankly, "Part of my fun is backing my own judgment. I'd rather take a flyer in real estate now and then with the chance of making a big killing than to turn in all I can save to the company."

Although participants were picked with great care and with as great an exercise of fairness as possible under the usual methods of personal judgment, there was some dissatisfaction with selections. Most of it was due to petty jealousy, but there were bound to be one or two unwise selections, as will always be the case so long as sycophancy exists. Bluffers can always be seen from the bottom, whether or not they are visible from the heights where the general manager's chair rests. Similarly one or two foremen felt they were

hardly treated because they were left out. Salve applied to their wounded feelings in the form of slight raises opened wounds in such participants as had wives who gossiped over the back fence, and who did *not* understand any sort of profit-sharing which allowed their rivals more to spend on hats than they had.

Not very long after the contracts were signed a period of business depression occurred. The company's earnings fell off and dividends were reduced to such an extent that it required, in the case of men who had just signed, all the bonus and part of the 10 per cent salary payment to satisfy the 4 per cent interest on stock. A profit-sharing scheme that ate up part of a man's salary didn't look good to them. To others, profit-sharing when there was nothing to share, was not much of an incentive to strenuous endeavor. In spite of Henry Ford's theory that a man will work harder to hold a $10,000-a-year position than to secure one, there is something in human nature to which unrealized delights appeal more strongly than known discomforts. What was endured once can be endured again. Pleasures gained become an old story. Hope is a greater incentive than fear, in that it is more often present. Fear may sway at a crisis, but hope is what preserves the race.

When the annual statements showed negligible credits to the participants' stock accounts there was a general feeling of disappointment. In some cases the feeling was that the thing had never amounted to anything anyway. A few had been suspicious from the start, believing that it was merely another manifestation of capital's effort to persuade the laboring man to barter away rights. Failure of profits merely confirmed this suspicion. Another group attempted to analyze the drop in profits. The falling off in sales seemed to some due to lack of salesmanship. Individual salesmen and the sales management were criticized—especially by the factory group. *They* were working just as hard and just as conscientiously as ever, and gossip in regard to motor trips and wine parties assumed undue importance. Even the management was severely criticized for retaining certain salesmen and executives. The eternal cry of the salesmen, "How could a salesman expect to make sales when the factories were shipping such rotten stuff?" became louder than ever. The always present feeling of antagonism between the selling and manufacturing departments was given a new impetus and old jealousies were revived.

Later on, the business depression showed signs of increasing. One

executive encountered hard luck. The management allowed him to convert the amount earned under his contract into cash. The news leaked out. Factories were shut down. More hard luck stories resulted in the further cashing of contracts. Before long, so many had cashed in that no one bothered to concoct hard luck stories. They just said they needed the money. At last reports, with one or two exceptions, everyone who had the courage had arranged for the cancellation of his contract. Immediate cash in hand looked better than stock in a concern over whose policy they had no control, in a country over whose prosperity they had no control. So ended the profit-sharing plan.

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